FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

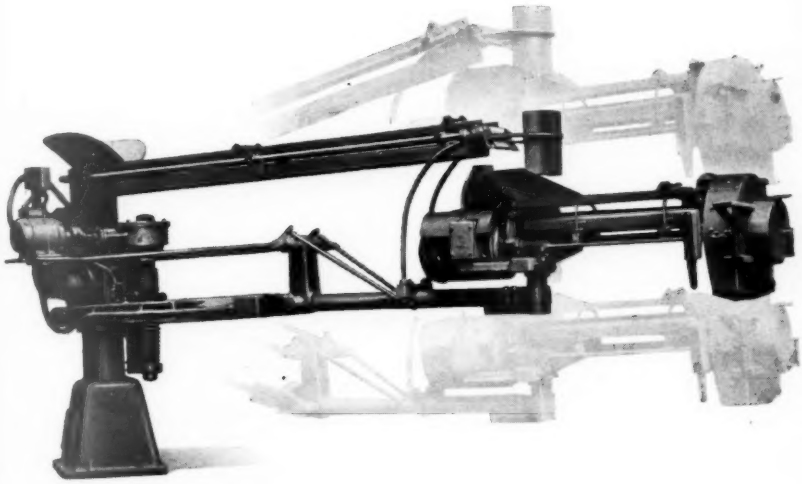
VOL. 103
No. 2147
Registered at the G.P.O. as a Newspaper

DECEMBER 5, 1957
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy, 1/-. By Post 1/4. Annual Subscription, [illegible] 52/-. Abroad 60/- (Prepaid)

DEC 3 0 1957

EAST ENGINEERING LIBRARY



STATIONARY TYPE SANDSLINGER
with arm raising and lowering gear

Sandslinger

Foundry Plant & Machinery Ltd
EGLINTON ENGINE WORKS
120 TRADESTON STREET
GLASGOW, C.5

NARROW GANGWAYS · LOW HEADROOM
ARE NO PROBLEM

YARD CLEARING · ASH CLEARING
TAKE LESS TIME

Muir-Hill Regd.
BUILT BY BOYDELL

Are these your bulk handling problems—then the Muir-Hill LH-1 10·5 cu. ft. hydraulic loader can help you too. As a first step send for the LH-1 brochure.

LH-1 HYDRAULIC LOADER

E. BOYDELL & CO. LTD., UNIVERSAL WORKS, OLD TRAFFORD, MANCHESTER, 16

dmEB 70

FOUNDRY TRADE JOURNAL

Established 1902

Vol. 103 | Thursday, December 5, 1957 | No. 2147

Editor:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

Assistant Editor: A. R. PARKES, M.I.B.F.
Commercial Editor: P. E. CARDEN.
Advertising Director: F. BARRINGTON HOOPER, B.A.
Production Manager: R. J. LOVELL.
Publisher: H. J. DWYER.
Circulation Manager: E. T. GRIFFITHS.
District Representatives:
G. P. ELLIOTT (*Northern Area*)
T. H. SMITH (*Scotland*)

PRINCIPAL CONTENTS

Technical : PAGE

Recent Developments in the Manufacture of Castings, by J. L. Rice, B.Met., R. W. Ruddle, M.A., and P. A. Russell, B.Sc.: Main topics discussed in the section of the paper printed this week are post-war developments in established foundry practice and in the alloys used for castings. Sub-divisions include: present status of the various methods, mould production techniques, die-casting developments, and the shell-moulding process 665

Preview of Ford's New Works: A brief description of Thames Foundry at Dagenham to serve as a "curtain-raiser" for a detailed account to follow shortly 673

Cheques—Guidance as to the New Position, by Lord Meston 677

Pattern-stores and Fire Precautions . . 678

Features :

Leader: Asking for Trouble 661
Featuring . . . Arnold Carr 663
Notes from the Branches 676
Equipment and Supplies 679
Book Reviews and New Catalogues . 680
Forthcoming Events 684

Commercial :

Company News and Contracts Open . 681
Raw Material Markets 688
Current Prices of Iron, Steel and Non-ferrous Metals 690

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Weekly

Single copy 1s.; *by post* 1s. 4d.

Annual subscription : home 52s., *abroad* 60s. (*prepaid*)

17/19 JOHN ADAM STREET, ADELPHI, LONDON, W.C.2

'Phone: TRAfalgar 6171 (10 lines)
'Grams: Zacateas, Rand, London

Asking for Trouble

When the notion of publishing an album of casting defects was bruited, a warning was given by Mr. J. Ferdinand Kayser that the project was fraught with danger. Seeing things from the buyer's viewpoint—as at this time he was more interested in using rather than making castings—he pointed out that buyers, like hypochondriacs, would imagine the castings they purchased suffered from every type of defect listed. Not only in this country, but overseas similar publications have been produced and widely sold. The impact has been so pronounced that Mr. Harry W. Dietert, the president of the American Foundrymen's Society, in a leading article in *Modern Castings*, has deplored the use of this word "defect" in foundry literature. He asserted that: "The castings industry loses millions of dollars each year in sales because of a bad habit. This bad habit is the deleterious association of the word "defect" with our product castings." Then he rightly points out that: "Outside the foundry industry, the word "defect" refers to failure of a product in service."

The real use of these albums of defects was to establish a nomenclature and help translation, and their purpose should have been confined to the technologists within the industry. For the outsider, the word "scrap" is the better one to use, as it signifies something rejected as soon as it is found. If by chance a casting is delivered and found to be unsatisfactory, it is treated legally as "scrap." "Defect" is an apologetic word and covers a multitude of expressions ranging from a blemish to downright scrap, and the man in the street associates it with the latter happening.

In Mr. Dietert's view, which we share, emphasis should be laid on "quality control" and "defect control" should be expunged from the foundry vocabulary. The existing albums of defects should be kept in foundry executives' offices and efforts should be made to keep them out of the hands of commercial interests. One effect of this banal influence on buyers of castings has been the efforts made by modern foundries to sell precision and shell-moulded castings. This at least is doing some good work in neutralizing the inadvertent bad publicity to be associated with mention of defective castings. It is not only in the various "albums" that damage is being done, but also throughout foundry technical literature that one finds constant references to defects. By better choice of phraseology, the same technical information can be imparted, without leaving in the mind of the reader that there is a close association between castings and defects. Anything that can be done to eradicate this notion will make a serious contribution to putting the foundry industry into its correct perspective.

ARNOLD CARR

Assistant Managing Director, Thos. W. Ward, Limited

Featuring . . . .

MR. ARNOLD CARR

MR. ARNOLD CARR has spent the whole of his industrial life with Thos. W. Ward, Limited, of Sheffield, where he has risen from being a commercial apprentice to the position he now holds—that of assistant managing director. When he first joined the company, it was in the foundry-supplies department and his interest in the foundry industry has increased continuously with the passage of time. He is now chairman and joint managing director of Marshall, Sons & Company, Limited, of Gainsborough and is on the directorate of the Widnes Foundry and Engineering Company, Limited. In 1941, he was a founder member of the Foundry Coke Merchants' Association and for twelve years was chairman of that organization. Concurrently, but for a total of fourteen years, he was chairman of the Pig Iron Merchants' Association. This year, he presides over the Refractories Association of Great Britain. He is a liveryman of the Worshipful Company of Founders and Freeman of the City of London.

During his service with Thos. W. Ward, Mr. Carr has spent much time in London, both during his early days as a commercial representative, and later, when he was elected to the board and appointed resident director in London.

Mr. Carr is also chairman and joint managing director of John Fowler & Company (Leeds), Limited, makers of diesel tractors and locomotives, etc., and of Ward, Longbottom, Limited. He is chairman and managing director of Derbyshire Mineral Mines, Limited, of Eldon Hill Quarries, Limited, and of Thos. W. Ward (Belgium) S.A., chairman of Thos. W. Ward (India) Private, Limited, and a director of the Deighton Motor Company, Limited, and chairman of North Lonsdale Tar Macadam, Limited, the Societe d'Enterprises et d'Operations Industrielles et Maritimes, Thos. W. Ward (Australia) Pty., Limited and Thos. W. Ward (Scandinavia) A.B.

Mr. Carr, in the course of his business, travels very extensively and whenever one meets him, he is either just off or just returned from abroad. He obviously has not much time for the pursuit of hobbies, but he does find relaxation in music, as he is a talented pianist. His friendly manner has gained for him a large number of acquaintances throughout the foundry industry of the world.

Tolerances for Pressure-die-castings

New Standards Issued by ZADCA

In the past, pressure-die-casters (not by any means the only founders to do so) have rather tended to tell customers or prospective customers in the engineering industry what is possible in the way of accuracy from their casting process rather than what is commercially feasible. Thus, engineers have come to demand very high standards of accuracy on *all* dimensions of die-castings, irrespective of whether such accuracy is really needed at the various points. Having this as a background to the problem and the beneficial experience of American die-casters in combating the situation to guide them, the Zinc Alloy Die Casters Association has resolved to point out to engineers that for them to insist on very high accuracy everywhere on a die-cast component is foolish, wasteful of man-hours in die-making and in castings production and neither conducive to high productivity nor good process economics. Instead, they state that tolerance limits should be graded, extreme accuracy only being specified where actually needed. To put over this viewpoint to engineers, the Association announces a completely new publication, "Engineering Standards for Pressure Die Castings." Copies have already been sent to all member firms, and will be widely distributed to users and potential users of pressure-die-castings; they are available on request to readers of this JOURNAL from 34, Berkeley Square, W.1. These standards which cover zinc and light alloys, were prepared by the technical committee of the ZADCA, in collaboration with the American Die Casting Institute and with the assistance and approval of the technical committee of the Light Metal Founders' Association.

Examples

As a simple example of the difference between the degree of precision recommended in the new standards and the finest that can normally be achieved, it is convenient to quote linear tolerances in a zinc die-casting to B.S. 1004. For a linear dimension stated to three-places of decimals on a section not measured across a parting line or affected by a moving core, the first standard shows a tolerance of ± 0.002 in. per inch for the first inch, with ± 0.001 in. for each additional inch; but if it is necessary, a minimum variation of 0.001 in. per inch can be held. On the other hand, where the designer requests a fractional or two-place decimal dimension, the standard allows the die-caster a basic tolerance of ± 0.010 in. per inch on the first inch, with ± 0.001 for each additional inch.

Standards 2 and 3 give the additional tolerances necessary when the dimension is measured across a parting line or is affected by a moving die part; standard 4 consists of a graph showing the optimum taper for walls. Standard 5 gives flatness tolerances for plane surfaces; standard 6 deals with the depth and taper of cored holes of $\frac{1}{8}$-in. dia. upwards; standard 7 covers ejector-pin marks and standard 8 describes the optimum machining stock allowance to avoid excessive tool-wear in machining operations.

As the use of the standards by industry proves their value and applicability, it is hoped that it may be possible to introduce them as a basis for preparation of codes of practice for die-casting design to be issued by the British Standards Institution. Before that, however, every effort is to be made to get the ZADCA standards into general use, and secure the confidence of engineers in their real merit.

"Open Day"

To further the introduction of the standards, on Thursday, January 23, 1958, the Zinc Alloy Die Casters Association will hold an "Open Day" in the Zinc Development Association's offices at 34, Berkeley Square, W.1, from 10 a.m. to 7 p.m. Engineers and designers are invited to attend and meet members of the technical committee to ask them questions about the new standards and other matters concerned with the design and application of pressure-die-castings. The film "Die casting—how else would you make it?" will be shown at intervals during the day and will be introduced by die-casting engineers. A selection of die-castings, chosen to illustrate how the standards should be used, will be displayed in the exhibition room.

Apprentice Competition Result

British Contestants at Stuttgart

The first international competition for apprentice moulders was held last week at Bad Canstatt, Stuttgart, Germany. It was organized by the European Committee of Foundry Associations, and apprentices from six member countries (Austria, Belgium, France, Germany, Holland and the United Kingdom) took part. The three British competitors were Richard Spencer (of James Smethurst & Company, Limited, Warrington), Philip Roberts (of the Bridge Foundry Company, Limited, Wednesbury), and Edward Sykes (of H. Downs & Son Limited, Huddersfield). In the final individual order they were placed, ninth, tenth and thirteenth respectively, and in the team placings, Germany was first, France second and the United Kingdom third.

Mr. J. W. Gardom, Dr. J. G. Pearce, C.B.E., and Mr. J. Bamford were present throughout the competition as judges from this country; Mr. J. Blakiston, president of the Institute of British Foundrymen, was also present for the opening and for the first two days of the practical and theoretical tests. Mr. John Collett, training officer of the Council of Ironfoundry Associations is a member of commission No. 1 of the European Committee, which introduced this competition as a means of stimulating recruitment and improving standards of apprentice training in the foundry industry throughout Europe, and it is expected that he will be reporting to the UK participating organizations in due course.

It is hoped to include a full commentary on the competition in this JOURNAL very shortly.

Dinner

BRITISH STEEL FOUNDERS' ASSOCIATION

The Rt. Hon. Iain Macleod, M.P., Minister of Labour, was the principal guest at the dinner of the British Steel Founders' Association held last Tuesday night at Claridge's, London. It was presided over by Mr. G. M. Menzies and with him at the high table were:—Sir John Elliot, Mr. C. H. Kain, Dr. C. J. Dadswell, the Very Rev. Dr. R. F. V. Scott, Mr. M. C. de Jong (president, European Foundry Committee), Sir Frederick Pickworth (the Master Cutler), Lt.-Col. Lord Dudley Gordon, D.S.O., Mr. R. P. Morison, Q.C., Sir Andrew McCance, Sir William Scott, O.B.E., Mr. T. H. Summerson, J.P., Sir Harry Jephcott, the Rt. Hon. Lord Clydesmuir, M.B.E., T.D., Sir George Barnett, Mr. F. A. Martin, O.B.E., and Mr. F. N. Lloyd.

Recent Developments in the Manufacture of Castings*

By J. L. Rice, B.Met., R. W. Ruddle, M.A., and P. A. Russell, B.Sc.

[ABRIDGED]

Developments which have taken place in the last decade in foundry practice and in the alloys used to make castings are described. The main emphasis is on the effect of these developments on the soundness, mechanical properties, dimensional accuracy, and the cost of the finished casting, and less on the way the improvements have been brought about. The topics discussed are: (1) the development of new and established processes; (2) alloy development; (3) inspection; (4) future trends. The paper is confined to cast iron and non-ferrous alloys. Advances in the production of steel castings have not been covered; many of the techniques referred to, however, are of general applicability.

Much of the process development work is, of course, general knowledge among founders but readers of this JOURNAL *must remember that, hitherto, its presentation to engineers has been sketchy. However, probably never before has such a balanced presentation of the implications of foundry progress over the last decade been assembled; for this the Authors are well qualified. Even to those intimately associated with the foundry detail of what is described, the paper confers a spectator's viewpoint of many matters, which is so valuable in assessing the relative merits of current trends.*

Introduction

The purpose of this paper is to review developments which have taken place during the last five to ten years in foundry practice and in the alloys used to make castings. The paper is principally intended for engineers, who will be mainly interested in the effect of these advances on the soundness, mechanical properties, dimensional accuracy, and cost of the finished castings. Most emphasis has therefore been placed on these aspects rather than on details of the way in which these improvements have been brought about. The paper is divided into several sections, which deal briefly with the following subdivisions of the subject: *viz:*—(1) Development of new and established processes; (2) alloy development; (3) inspection and (4) future trends. Developments in cast steels are numerous and would require treatment at considerable length to do them justice. For this reason the scope of the present paper has been confined to developments in the making of iron and non-ferrous castings, although many of the matters referred to are of general applicability.

PROCESS DEVELOPMENT

Established Processes

Present Status of the Various Methods

In conventional sand moulding, the silica grains are bonded with clay which either occurs naturally with the sand or is added during mixing. For coremaking, binders based on linseed oil have been used as an alternative to clay for a good many years and latterly solutions of synthetic resins have been used for the same purpose. So far as this paper is concerned, the use of such binders will be regarded as an extension of conventional methods.

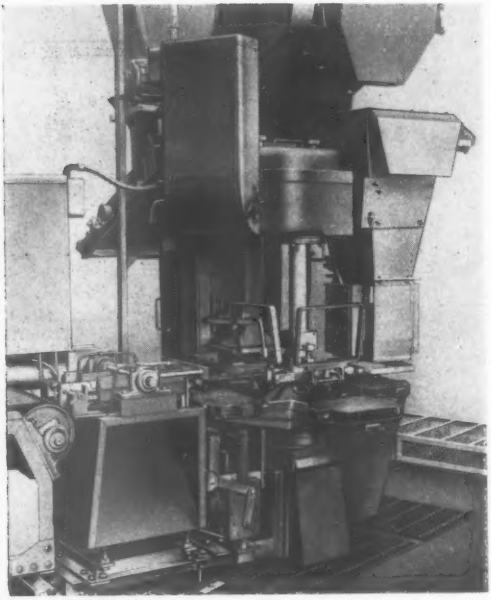
Casting into metal moulds, either by gravity or under pressure, is the most common means of producing light-metal castings (see under "Die-casting Developments"). The gravity-die-casting process is also used for certain of the copper-base alloys, notably brass and aluminium-bronze, and the gravity-die-casting of cast iron by the Eaton-Erb process (Pollard and others, 1946-47†) has been in operation for some years.

The very large number of articles which have appeared in the technical Press in recent years concerned with new and specialized processes in the foundry industry, principally claiming higher dimensional accuracy and improved surface finish may have given the impression that these have largely displaced conventional sand moulding. Such an impression is, however, false, and it is clear from the figures quoted under "Die-casting Developments" for aluminium alloys that in this field at least the scope for displacement is limited, since many of the advantages claimed can more easily and economically be obtained by die-casting. In the copper-base and ferrous fields there are greater potentialities, since even where die-casting is possible die life is shorter owing to the higher pouring temperatures employed, and the dimensional accuracy of die-casting is less favourable.

The major examples of the newer foundry processes are shell moulding and the carbon-dioxide (CO_2) process. These are still strictly sand-moulding processes in that a silica sand is used, but the means of bonding is novel, employing a solvent-free synthetic resin in the case of shell moulding, while in the CO_2 process the sand grains are coated with a solution of sodium silicate from which silica is

*Paper presented at last week's general meeting in London of the Institution of Mechanical Engineers. The Authors at the time of preparing the manuscript were, respectively, liaison officer, British Non-Ferrous Metals Research Association; head of melting and casting BNFMRA, and director, S. Russell & Sons, Limited. Mr. Ruddle has since accepted a position in America with the Foundry Services' organization and Mr. Rice is now with Harlow Metal Company, Limited.

† An alphabetical list of references is given in an Appendix to the Paper.



(Courtesy of Rubery, Owen & Company, Limited)

FIG. 1.—*Automatic moulding machine.*

precipitated by passing carbon dioxide gas through the rammed mass. Both differ from conventional sand moulding in that until it is hard and rigid the mould or core is not removed from the pattern or corebox.

There is considerable scope for the combination of these processes with traditional methods and this is particularly true in the case of the CO_2 process. By this means, the advantages of the new processes, discussed under "New and Specialized Processes" in what follows, can be utilized while at the same time the economic attractiveness of the older methods can be largely preserved.

It must not, however, be overlooked that the advent of new processes tends to give an impetus to the development of old ones, and scope still exists for improving the accuracy and surface finish of conventional sand-moulded castings.

Mould Production Techniques

The range of green-sand moulding machines available to the foundry industry in Britain has recently been reviewed by McIntyre (1955). The method of mould production by squeezing, jolting, slinging, and combinations of these has not changed fundamentally in recent years although a steady improvement in the design, performance, and reliability of moulding equipment has taken place, and this has been reflected in the quality of the moulds produced.

It is increasingly realized that if such equipment is to be effectively used, it must be accompanied by overhead sand supply and the provision of conveyors, gravity or powered, to take away the finished moulds and return the box parts after knock-out. The impeller-type sand rammer is usually regarded as suitable principally for the larger works, and on box parts greater than four sq. ft. in area, but the successful introduction of one into a jobbing foundry employing only nine men has been described (Blandy, 1955).

Equipment, of which the machine shown in Fig. 1, is an example, has recently appeared on the market, whereby, after the box part is placed on the pattern, an indexing mechanism controls the subsequent operations up to the point of delivering the completed half-mould on to a roller conveyor. This is an instance of automation in the foundry industry, and one which is likely to be increasingly copied and extended in the future.

Two types of coreblowing machine are at present in common use. In the first an aerated stream of sand is used to fill the corebox, generous venting of the box being needed so that the air vehicle can escape. In the second, a cartridge of sand is impelled into the box by air pressure behind it. The venting of the corebox is less critical here, since provision need only be made for the escape of the air already in the box. Box wear, too, is less, but until recently the method has been applicable only to small cores of about 2-lb. weight. Now, however, the principle has been modified and extended in the core-shooter type of machine capable of handling cores up to 88 lb. in weight.

Some interesting developments have taken place in the matchplate field, the result being that this speedy method of production is now applicable to shorter runs. The first is the aluminium pressure-cast patternplate which came into prominence in Britain after the visit of the Foundry Productivity Teams to America. The method of production (Mantle and Potts 1952), employs a plaster mould into which aluminium is cast under pressure of 6 lb. per sq. in. Definition and surface finish are good and the use of aluminium ensures that any finishing that is needed can be speedily carried out. Although more susceptible to mechanical damage, such patternplates have an adequate life for medium runs, given reasonable care and attention.

On similar lines has been the development of the epoxy-resin patternplate (Orr 1955). It is claimed that such synthetic-resin patterns, which can be reinforced where required by glass-cloth or metal rods, require even less finishing than aluminium and that they have a superior resistance to denting and, if properly reinforced, to abuse by foundry labour.

Both the methods discussed above make possible the production of moulding patterns with qualities of accuracy and surface finish which, provided the subsequent moulding techniques are satisfactory, will be reflected in the casting. These methods have particular value too when a matchplate is made up of a number of identical patterns, since the reproducibility of dimension between one pattern and the next can thereby be considerably improved. Shell moulding has also been employed with success in recent years to achieve the same

ends with the conventionally mounted type of pattern in cast iron or brass.

Quality of Castings

In recent years, steady advances have taken place in melting and casting techniques, particularly for non-ferrous metals, and these in turn have led to corresponding improvements in the quality of castings generally. Poor melting practice often results in pick-up of hydrogen, oxygen, sulphur-bearing and other gases and the formation of non-metallic inclusions in the melt. These may in turn give rise to gas porosity and inclusions in the castings. The incidence of both these defects is steadily diminishing as the result of improvements in melting techniques, which include the use of flux covers to agglomerate and remove inclusions (and to minimize their formation), and the use of degassing techniques to remove gases picked up during melting or present in the material charged to the furnace. Various degassing techniques are now practised in industry. Light alloys are generally degassed by purging the melt with nitrogen or chlorine, these gases being bubbled through the melt; chlorine can also be evolved from solids such as hexachlorethane which are plunged below the surface of the melt. Nitrogen-degassing techniques are also being employed with copper alloys, the nitrogen being taken from a cylinder or evolved from calcium cyanamide, but an alternative frequently used is the oxidation/reduction technique in which the melt is first oxidized during melting and deoxidized with phosphor-copper before pouring. Oxidation causes the expulsion of hydrogen and the subsequent deoxidation removes the oxygen which would otherwise combine with the traces of residual hydrogen during solidification to give steam porosity.

Apart from gas porosity, the soundness of a casting depends upon the extent to which the shrinkage which occurs during solidification can be compensated. During freezing, most metals and alloys contract to the extent of about 3 to 7 per cent. by volume (cast iron is exceptional in having negligible contraction on freezing) and, unless remedial steps are taken, this results in either the formation of a cavity (or multiple cavities) within the casting, and/or the collapse of the outer walls. The usual methods of ensuring adequate feeding during solidification are to attach to the casting a relatively large lump of metal, known as a feeder, which remains molten longer than the casting itself and thus provides a supply of liquid metal to compensate for the inevitable shrinkage. This technique is sometimes aided by placing in the mould metal chills which speed the freezing of the casting itself, thus increasing the difference in the freezing time of the casting and the feeder. The feeder must subsequently be severed from the casting and this and the subsequent fettling operation may be time-consuming and expensive, especially when the casting is made in a tough material. In recent years it has been found possible to reduce the size of the feeders attached to the casting and at the same time to increase their efficiency by (*a*) surrounding the feeder with a sleeve of insulating porous plaster (non-ferrous alloys only) or (*b*) surrounding the feeder with a sleeve made in an exothermic material of the Thermit type and (*c*) placing an exothermic material on the upper surface of the feeder (Skinner and Ruddle, 1952; Atterton and Edmonds, 1954; Ruddle, 1954). All these methods increase the casting yield and reduce the cost of fettling. The economic advantage is often considerable, especially with steel castings.

The presence of non-metallic inclusions in castings may also result from the use of improper running and gating methods, even when the metal poured into the mould is itself perfectly clean at the time of pouring. If the gating system is incompletely filled with metal, the upper surface of the stream may become heavily oxidized and turbulence may cause the oxide thus formed to break up and pass in fragments into the casting. If, too, the design of the gating system is such that the metal

Key:—
(1) Melting furnace.
(2) Piston casting machine.
(3) Pyrometer.
(4) Hydraulic power unit.
(5) Hopper.
(6) Annealing oven.
(7) Loading area.
(8) Press
(9) Mill.
(10) Skid washer.
(11) Overhead monorail conveyor.
(12) Oscillating conveyor.
(13) Hydraulic pump.

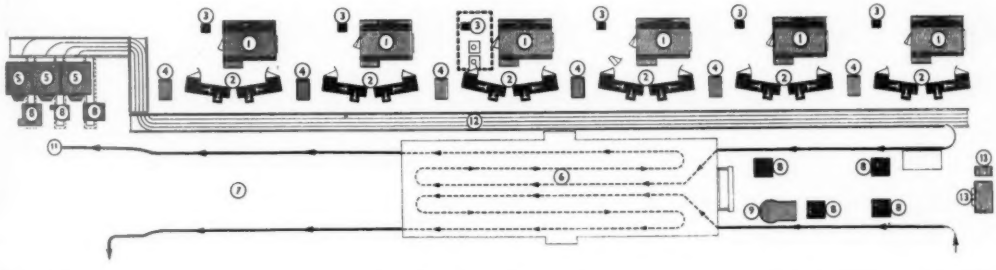
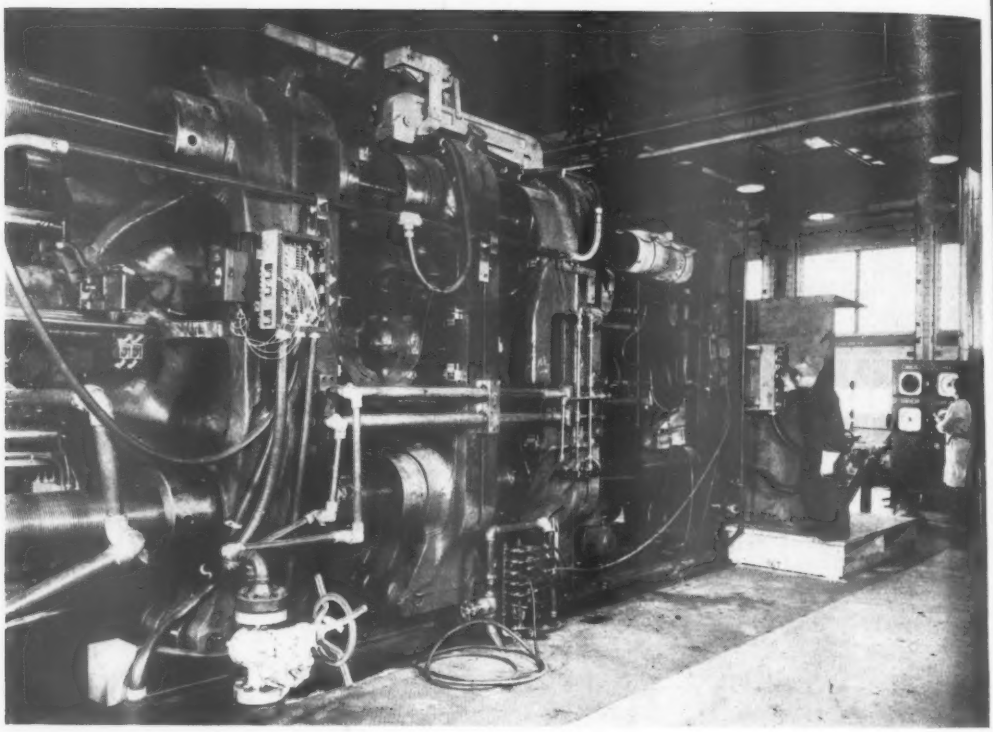


FIG. 2.—*Layout of a modern highly mechanized die-casting foundry.*

(Courtesy of R. H. Herrman, *Foundry*)



(Courtesy of *Light Metals*)

FIG. 3.—*Die-casting machine capable of producing aluminium-alloy castings up to 75 lb. weight.*

enters the mould cavity with a high velocity, severe turbulence will take place there; and impingement of the jet of metal on cores or mould walls may result in sand erosion and the entrapment of sand inclusions in the casting. In the past, gating has been very much a matter of trial and error, but research in recent years has gone far toward establishing the scientific principles involved so that gating systems capable of avoiding the above effects may be designed (Ruddle, 1956). The use of these techniques together with the improved methods of feeding already described is destined to produce a considerable improvement in casting quality.

The quality of a casting is determined to a considerable degree by the details of its design and here, too, steady progress has been made during the last few years. Usually, it is desirable that the design of a casting should permit solidification to take place progressively from the thin sections to the thicker ones. In particular, it is most important that "hot-spots" such as occur at bosses, ribs, changes of section, etc., should be minimized and that features liable to give rise to hot-tearing should be avoided as far as possible. The designer can help in this direction by the provision of suitable fillets at all changes of section, by staggering ribs placed on either side of a plate-like section and by paying attention to numerous other factors too detailed to enumerate in this paper. Although the design of castings has progressed substantially, much still remains to be done, and the Authors appeal to all engineers concerned with casting design to collaborate with the founder at an early stage. An excellent series of French booklets on the subject of casting design is in the course of publication* and a subcommittee of the Institute of British Foundrymen is at present considering this question and will doubtless produce a comprehensive report on the subject in due course.

The mechanical properties of castings are dependent upon the purity of the metals used in the preparation of the alloy, to an extent which varies considerably from alloy to alloy. Examples of high sensitivity in this respect include the harmful effects of as little as 0.001 per cent. aluminium in gunmetals and of more than about 0.15 per cent. magnesium in aluminium/copper alloys. Not all impurities are harmful to this degree and it is by no means the Authors' intention to deprecate the use

* The booklet referring to the design of iron castings has recently been translated and published by the Council of Ironfoundry Associations.

of secondary ingot. It is extremely important, however, that close control should be kept over the level of impurities. Advances in this respect have been made possible as the result of (*a*) the availability of material of higher purity than hitherto as the result of improved methods of extraction and refining of metals generally, and (*b*) the use of improved methods of analysis. In particular spectrographic methods of analysis are being employed in the foundry industry to an increasing extent and this is resulting in closer control over the presence and amount of both impurities and main alloying constituents. The latest development in this direction is the introduction of the direct-reading spectrograph, capable of carrying out complete analyses of alloys within a few minutes.

The improvements in established processes described, all tend towards supplying the engineer with castings of higher mechanical properties, improved soundness, and better dimensional accuracy and surface finish. However, if the full benefits are to be reaped from them, well-established moulding techniques must be at least maintained and if possible improved. The growing shortage of skilled

TABLE I.—*Tolerances in Die-casting.*

Type of casting.	Alloy group	Tolerance on lengths formed wholly within one part of the die.	Additional tolerance on lengths partly in one part of the die and partly in another (in.).
Pressure-die-castings	Zinc	±0 001 in. per in.	±0.004—±0.006
	Light alloys	±0 0015 in. per in.	±0.004—±0.007
Gravity-die-castings	Light alloys	±0 005 (first inch) plus ±0 003 for each subsequent inch	±0.012—±0.022
	Brass, aluminium-bronze	±0.01 (first 2 in.) plus ±0 0025 for each subsequent in.	±0.005—±0.010

moulders means that in matters such as sand control less can be left to decision on the floor and more control must be exercised by the laboratory staff.

It is probably true to say that progress in this respect has been more marked in ferrous than in non-ferrous foundries the latter being usually content to use natural clay-bonded sands won from a small number of well-known deposits. The work of Parkes and his collaborators at the British Cast Iron Research Association on the properties of moulding sands has been extensive, and recent investigations (Parkes and Godding, 1953) into the causes of scabbing in moulds has widened the knowledge of this phenomenon and has suggested means whereby it can be avoided.

Die-casting Developments

The manufacture of die-castings has been increasing rapidly during the last decade, and an idea of the rate of increase may be gained from the fact that die-castings accounted for nearly 80 per cent. of the total of aluminium-alloy castings produced in the United States of America in 1955, whereas the corresponding figure for 1952 was only 65 per cent. Of the aluminium-alloy castings produced in the United Kingdom during the first four months of 1956, 56 per cent. were made by gravity-die casting, 18 per cent. by pressure-die-casting, and the balance by various sand processes.

Recent developments in pressure- and gravity-die casting may be divided into two groups, those resulting in increased productivity and those giving rise to improved quality of the product. Foremost in the first group is the increased use of automation techniques. Pressure-die-casting has always been semi-automatic in so far as the metal is often cast and the parts of the die are opened and closed automatically, but machines are now appearing in which the casting is made and trimmed completely by one machine or linked machines (British Productivity Review, 1955); very high rates of production are therefore possible. Automation is also spreading to gravity-die-castings and here machines are being developed in which the machine carries out the casting operation and moves the dies and cores without intervention by hand. Fig. 2 shows a typical production line for the mass-production of gravity-die-cast automobile pistons (Herrmann, 1956). Clipping machines will no doubt be added before long to these assemblies to render the whole process completely automatic. Another closely allied development is that of automatic temperature control of the (water-cooled) component parts of dies. This is leading to increased production in both pressure- and gravity-die-casting, there being less waiting for the die to assume the correct temperature, and is in any case a necessity when full automation is applied (British Patent, 1956).

A development of considerable importance is the marked increase in the size of casting which can be produced by pressure-die-casting methods, the maximum now being in the region of 75 lb. in aluminium. Fig. 3 shows a 72-in. machine which is being used to make automobile cylinder-block castings weighing 43 lb. after trimming, at the rate of 30-35 per hr. This casting replaces a cast iron block weighing 175 lb.; it is noteworthy that the 129 holes required are cored to tolerances close enough to eliminate the need for drilling.

In recent years a steady extension in the life of the dies in both processes has been made possible by the use of more refractory metals for making dies. Some firms are now employing heat-resisting alloys of the Nimonic type for parts of dies which are known to be subject to particularly severe wear. At the other end of the scale, methods have been developed for making cheap cast iron dies for short runs. These dies, which are comparatively thin, are cast to shape by a semi-precision process and require only a relatively small amount of machining to finish them.

The introduction of automatic temperature control of dies referred to earlier has also resulted in some improvement in the quality of die-castings, since the cooling conditions obtaining are under

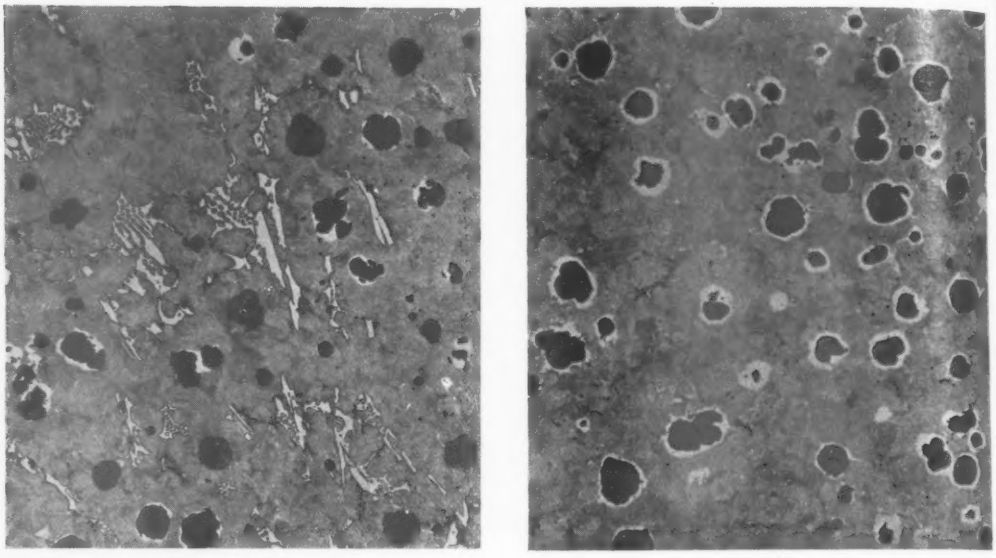


FIG. 4.—*Photomicrographs of spheroidal-graphite iron; left, cast in a green-sand and, right, in a shell mould.*

better control than hitherto. At one works (British Productivity Review, 1955) the indications of recorders on every die are exhibited in a central control-room where the technician in charge can see at a glance whether any castings are being made under conditions which are outside those laid down as standard practice for the particular casting concerned. Another factor which is leading to the production of light-alloy die-castings of higher quality is the substitution of electric melting for melting in gas fired and oil-fired furnaces (British Productivity Review, 1955). The former method of melting is superior in that there is less danger of gas pick-up and probably also of the formation of inclusions.

Some increase in the dimensional accuracy of die-castings has taken place in recent years, as the result of the use of higher die-pressures in pressure-die-casting and as the result of better methods of die manufacture. Tolerances which are now readily attained in pressure and gravity die-casting are given in Table I (Penney, 1953).

A technique developed some years ago and now being increasingly used seems likely to effect a substantial improvement in the soundness and definition of gravity-die-castings. This is the so-called "low-pressure" method. In this process, the metal is forced into the closed die under a pressure of 4 to 6 lb. per sq. in., the pressure being maintained until the metal in the die cavtiy is solid. The method has the economic advantages of eliminating feeders and reducing the size of the runners.

Vacuum casting in which the die cavity is partially evacuated prior to introduction of the metal is now established in both the gravity- and pressure-die-casting fields. In the former it is used to ensure complete filling of intricate dies (finned cylinders) and results in excellent reproduction of fine detail as well as reducing the incidence of misruns. The vacuum process has several advantages in pressure-die-casting; in particular it leads to high soundness even when the casting is made in an alloy whose casting characteristics are poor; furthermore, it reduces the incidence of poor surface-quality and sub-surface pinholes. Dimensional accuracy is improved and thinner sections (down to 0.035 in. in zinc) can be cast.

Another factor leading to an improvement in the quality of die-casting is the development of alloys intended specially for die-casting. Not many years ago most of the alloys used, especially of light alloys, were those originally developed for sand casting but in the last two or three years modifications to the compositions of some of these alloys have been made to improve their die-casting properties. For this reason, several new specifications have been added to B.S. 1490:1955. (See under "Aluminium Alloys.")

For many years, the gravity-die-casting of brass has been troublesome because accretions of zinc and zinc oxide formed on the die surfaces. A method of overcoming this has now been devised which involves the use of a die-coating containing a metal oxide capable of being reduced to a lower oxide of zinc. The die-casting of copper alloys has extended in recent years and in addition to brass such materials as leaded brass, aluminium-bronze,

TABLE II.—*Mechanical Properties of Gunmetal Castings to B.S.1400 LG2, made in Green-sand and in Shell Moulds.*

Mould material.	Plate edge.*			Plate centre.*			D.T.D. bar.†		
	Porosity, per cent.	U.T.S., tons per sq. in.	Elongation, per cent. on 2 in.	Porosity, per cent.	U.T.S., tons per sq. in.	Elongation, per cent. on 2 in.	Porosity, per cent.	U.T.S., tons per sq. in.	Elongation, per cent. on 2 in.
Green-sand	1.3	11.8	21.2	1.7	9.8	11.8	0.6	15.1	27.2
½-in. shell mould unbacked	1.7	13.5	23.7	2.9	9.7	13.8	0.8	15.1	26.6

* 6 by 3½ by 1-in. plate. † 8 by 1-in. diameter test-bar.

and high-tensile brass are also cast.

Developments in centrifugal casting have included the use of water-cooled moulds for the manufacture of long tubular castings. An ingenious method of manufacturing air-cooled cylinders for internal combustion engines has recently been devised (Teves, 1954). Copper and iron are poured together into a rotating mould and the copper, because of its greater density, segregates to the exterior of the cylinder and thence to the fins. There is thus produced a cylinder with an iron body with rigidly attached copper fins of high cooling capacity.

The use of bimetallic bonding to exploit the properties of two different metals in a single component is exemplified in the A1-fin process by means of which steel or iron inserts are first given a coating of aluminium by a hot-dipping process and then placed in the mould or die for the production of the aluminium casting. The process has been extensively used in the manufacture of die-cast aluminium pistons, the ferrous insert providing a wear-resistant groove for the top piston ring.

New and Specialized Processes

Shell-moulding Process

The shell-moulding process was developed in Germany during the 1939-45 war and received its early publicity in 1947 (McCulloch, 1947*). Briefly, the process (Ames, 1953; Emmerson, 1953; Rice, 1954; Bailey, 1956) is one in which a mix of silica sand and phenol-formaldehyde resin is dumped, blown or pressed on to a hot metal pattern. The resin softens and flows, carrying the sand grains to the face of the pattern and binding them in position there. After about 20 sec. of this investment, a shell of sand and partly cured resin ¼-in. or more thick, has been built up on the surface of the pattern. The excess sand/resin mix is then removed and the pattern, with the partly cured shell adhering, is placed in an oven for 2 min. or less to complete the curing. The hard yet permeable shell is then removed from the patternplate. Two such shells for a complete mould and are commonly glued together before being cast. After casting, the heat of the metal destroys the resin bond at the casting face, but the mould as a whole remains rigid long enough for the casting to freeze without additional support normally being required.

Because of the cost of the resin, shell-moulded castings are usually dearer than those made by conventional methods, but the improved dimensional accuracy and surface finish of the castings often make it possible for this to be compensated for by savings in weight and in post-foundry operations such as machining and polishing.

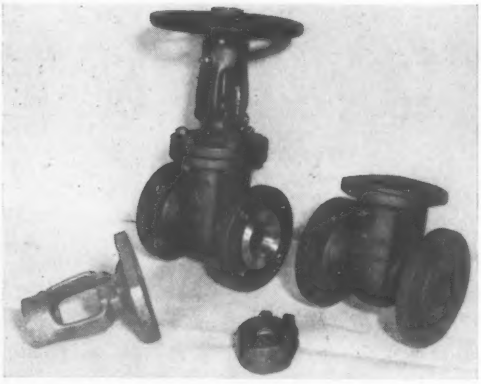
The standard of accuracy obtainable must not be overstated, but it should usually be possible (Flinn and others, 1955; Sheptak, 1955) to maintain a dimensional accuracy of ± 0.005 in. per in. provided that such dimension do not occur across the mould joint-line. For dimensions above 3 in. closer tolerances can normally be held. It has to be borne in mind that where castings with this degree of accuracy are required the amount of contraction is very largely dependent on casting design, and a certain amount of trial-and-error work in the foundry may be necessary. Little data on the relationship between design and contraction is so far available. The engineer should be clear in his own mind whether he wants absolute accuracy in a casting or whether he merely wants narrow dimensional limits which will ensure castings fitting a machining jig. The latter requirement can be provided more cheaply. Since heat is required during investment a metal pattern is essential and when a high degree of absolute accuracy is wanted, this will add to the cost of the pattern. Pattern costs have often in the past been higher than they need be, but the shell-

* FOUNDRY TRADE JOURNAL, December 4, 1957.

TABLE III.—*Mechanical Properties of Magnesium-alloy Test-bars made in Green-sand and Shell Moulds.*

Alloy.	Nominal composition.					Condition.	Ultimate tensile strength, tons per sq. in.		Minimum specified.	Elongation, per cent.		Minimum specified.
	Aluminium.	Zinc.	Manganese.	Zirconium.	Rare Earths.		Sand.	Shell.		Sand.	Shell.	
AZ63A	6.0	3.0	0.15min.	—	—	As-cast	28.3	29	24	5.5	5.5	4
AZ63A						Solution-treated	38.2	34.9	34	10.2	8.3	7
AZ63A						Solution-treated and aged	40.2	35.6	34	5.4	3.8	3
AZ92A	9.0	2.0	0.10min.	—	—	As-cast	24.3	24.0	20	1.6	1.0	1
AZ92A						Solution-treated and aged	40.8	34.9	34	1.4	0.8*	1
EZ33A	—	3.0	—	0.7	3.3	Solution-treated	24.4	23.9	20	3.8	4.2	2
ZK51A	—	4.6	—	0.7	—	Solution-treated	38.9	39.7	34	6.2	6.9	5

* Bar showed porosity on fracture.



moulding process is in the main suitable only for medium to-long runs, and has no application for one-off work.

As stated earlier, shell moulds can usually be cast without any form of external support, and when this is done the castings cool more slowly than when made by conventional moulding methods. Fig. 4 shows how in spheroidal-graphite iron the slower cooling rate of shell moulds results in the virtual absence of free carbide.

The macrostructures of shell-moulded castings tend to be equiaxial but there is little evidence from published work that mechanical properties are impaired. Table II shows that the mechanical properties of shell-moulded gunmetal plate castings and test-bars in B.S. 1400, LG2 compare favourably with similar castings made in green sand moulds. In Table III, dealing with certain magnesium-base

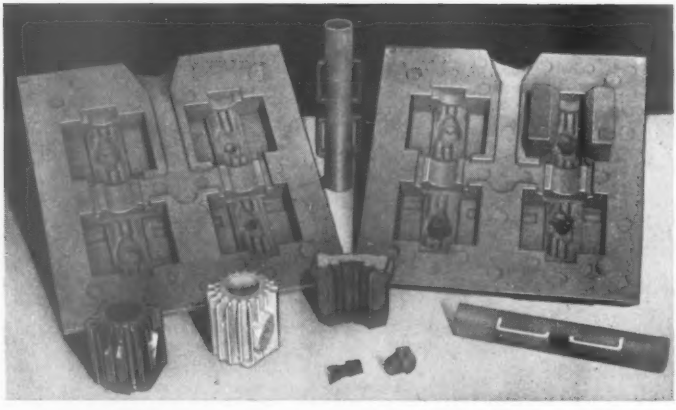
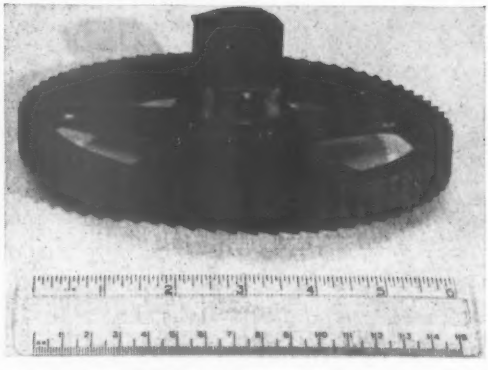


FIG. 5.—*Typical shell-moulded castings in various metals.*

(*a*) (*above*) *in Langally* 3B.
(Courtesy of "Shell Moulding": *Machinery*)

(*b*) *in iron and aluminium.*
(Courtesy of *Machinery*)

(*c*) (*below*) *in grey iron.*
(Courtesy of Institute of British Foundrymen)



alloys, the mechanical properties of shell-moulded castings are seen in some instances to be slightly inferior but still within specification.

The thinness of the shell mould makes easier the escape of the air present in the mould which might otherwise be entrapped in the casting, and this is presumably the reason why shell moulded iron castings are so much less prone to blistering when subsequently vitreous enamelled (Adams, 1954). For similar reasons, thinner sections can normally be run in shell moulds than would be practicable with conventional green-sand moulds. All the principal ferrous and non-ferrous alloys have been cast by the process, but the major applications probably lie with the stainless-steel and copper-base alloys. Examples of shell-moulded castings are shown in Fig. 5.

(*To be continued*)

A £1,500,000 CONTRACT for the construction of a natural gas pipeline system in Lower Austria has been awarded to Constructors John Brown, Limited, by Niogas-Niederosterreich Gasvertriebs AG—the Lower Austria organization responsible for the distribution of gas fuel. The company will use the services of its American associate, Williams Bros., and Austrian subcontractors will carry out a considerable part of the work. Construction of the 160-mile pipeline should be completed by autumn next year.

Preview of Ford's New Works . . . Thames Foundry at Dagenham nearing Completion

Giving a new look to Dagenham's riverside skyline, and soon to be in full production, Ford Motor Company Limited's new, £8,000,000 "Thames" foundry is one of the most advanced of its type in the world. In design, mechanization and standard of working conditions it is claimed that it compares with any other unit in the world and brings Ford's one step nearer the completion of the most ambitious programme in its history. This programme, financed entirely out of the company's own resources, has the objective of allying greater production with increased efficiency—industry's only effective answer to inflation. What follows is a preview of the new works, to act as a curtain-raiser for a full-scale account which is to be printed when the plant is in full production.

At the Thames foundry (the existing foundry of Ford's is called the Dagenham foundry), increased productivity will be practically demonstrated and output per man/hour of the particular types of castings involved will be twice what it would be under previous methods of manufacture. Initially, the Thames foundry will need 1,800 operators who will be transferred from Dagenham foundry; the latter will continue working with about half its present strength so that there will be no labour displacement. The new foundry is planned for a daily capacity of approximately 400 tons of castings—about two-thirds of the total Ford output. For the most part it will manufacture cylinder-blocks and -heads and the larger castings for tractors.

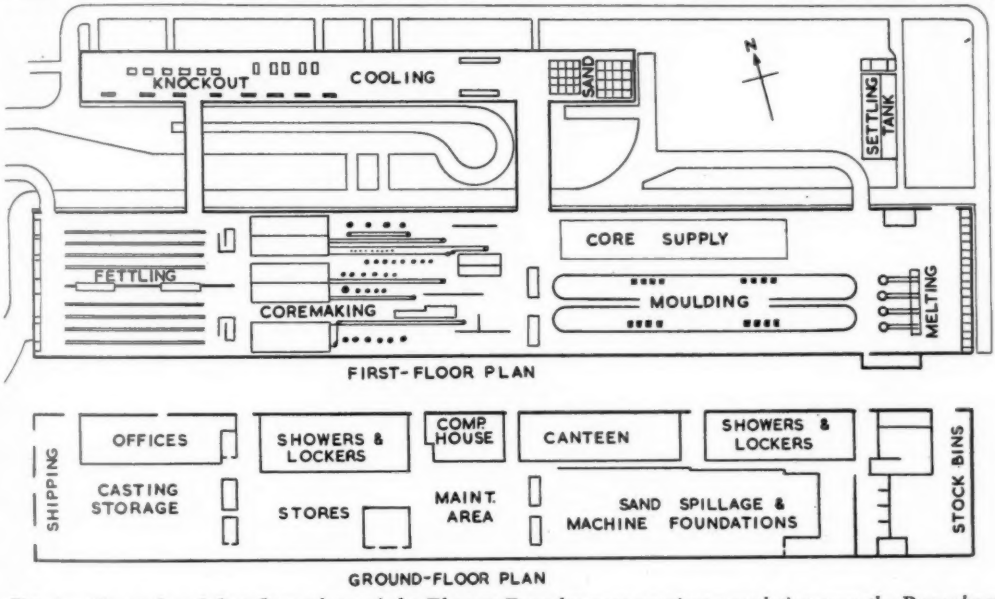


FIG. 1.—*Ground and first-floor plans of the Thames Foundry now nearing completion near the Dagenham works of Ford Motor Company, Limited.*

Spacious Layout

The two buildings (Figs. 1 and 2) constituting the Thames foundry cover a ground area nearly three times that of St. Paul's Cathedral. The main building measures 1,200 by 180 ft. and reaches as high as 70 ft. It will incorporate the main foundry operations of melting, moulding, core-making and fettling. The ancillary building, 700 by 60 by 70 ft., will contain the sand handling and drying, casting cooling, grinding and cleaning sections. The main building is a two-floor structure. The lower floor will contain the maintenance equipment, offices, stores and all employee amenities—locker rooms, toilets, showers and canteen. The canteen will accommodate 700 men at a sitting and hot meals will be provided by the most up-to-date kitchen equipment. Each man will have a heated twin-locker, one part for his working clothes and the other for his outdoor clothes.

For the main operating floor, bays of 60 by 60 ft. were chosen as the design basis, and steel columns at 60-ft. centres support lattice girders which form

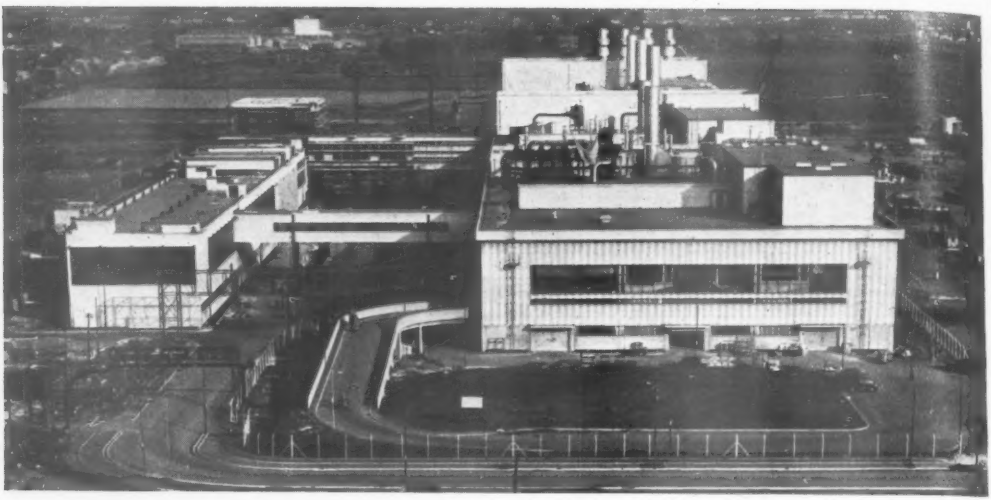


FIG. 2.—*General exterior view of Ford's new Thames Foundry taken from the west; note the siting of cupolas at the far end,* i.e., *on the eastern end.*

the fabric of the building. These are utilized for carrying much of the sand-system and monorail conveyor equipment, and the material storage hoppers, thereby eliminating individual supporting columns and providing maximum free working-space at floor level.

Cleaned and Filtered Air

Optimum working conditions have been provided, an outstanding feature being the heating, ventilating and air-purifying system which warms the building and changes the whole air content more than seven times an hour (in the moulding and fettling departments as many as sixteen times an hour). All air entering the building will be cleaned, warmed in winter and fan-cooled in summer. Steam heaters round the perimeter of the building and over main aisles and doorways compensate for heat losses. Windows and fans are thermostatically controlled to allow for temperature variations.

Special dust-extraction systems will collect dust at the source and deliver it by ducting to wet-type separators. A sluicing system will receive the slurry produced, together with slag from the cupolas, and will carry it to settling tanks and ponds. The water will then be returned for re-circulation.

Manual duties normally associated with foundry-work have been eliminated wherever possible and mechanical-handling equipment installed. An indication of the degree of mechanization employed is reflected by the amount of power necessary to drive all the equipment. Approximately 15,000 kva.—enough electricity for the domestic needs of a fair-sized town—will be distributed by the five sub-stations on the roof of the main building.

Melting

Pig-iron and coke will reach the foundry by rail wagons, and special consideration has been given to the handling of coke to keep breakages to a minimum. A telpher system will lift containers from the wagons and convey coke to storage hoppers adjacent to the cupolas to avoid rough and excessive handling. The same telpher system will handle limestone. Skip-hoist machines will load pre-weighed charges of pig-iron, scrap, coke and limestone into four, 108-in. dia. hot-blast, water-cooled cupolas (two for each working shift). Each cupola has an eight-ton receiver which delivers the molten metal into ladles. The ladles are suspended from monorail-supported electric towing and hoisting units to facilitate transferring the metal to the moulds at the pouring stations. In addition, there is a 20-tons per hour capacity pig-casting machine for "pigging" surplus metal.

Semi-automatic Moulding

Two moulding lines are fed from their own automatic sand systems and are fully-equipped with smoke and fume collection apparatus. Each line incorporates eight semi-automatic moulding machines, working within a continuous 800-ft. mould conveyor of the latest pallet design. The castings will be removed from the drag mould by means of special hook carriers suspended from a monorail (cooling) conveyor, located vertically above each mould conveyor. The latter will deliver them to the ancillary building where, after cooling for approximately three hours, they have the sand and cores removed by vibrators before passing to a battery of grinding machines for rough fettling.

Next the castings return to the main foundry building by two further monorail-type conveyors for further cleaning operations, and finally to eight more fettling lines for finishing and, where required, for water pressure-testing. They are then ready for the machine shop.

Machine-made Cores

Cores are formed and baked at least 24 hours ahead of the moulding process. The coreshop is centrally located in the main building and conveniently arranged in order to supply cores as required for each moulding line. The core sand is mixed at a central high-level station, this operation being completely automatic and actuated by the insertion of a punched card (one for each type of sand mix) into the weighing system. The mixed sand is conveyed by two pneumatic systems—said to be the only ones of their kind outside the United States—to the coremaking machines.

All the cores will be made by 39 semi-automatic vertical coreblowers. Cores then go by conveyor to five continuous horizontal ovens for baking. These are built at elevated level to facilitate operations and to provide storage space beneath. After delivery from the ovens, a core-wash is applied and this is dried in three horizontal drying ovens. Nine core-grinder machines will be employed to grind off surplus sand where required.

Services

The steam and gas mains and the power cables all follow the line of a common trestle-way to the new site from the company's power-house and coke ovens—a distance of about half a mile. A road joining the main plant to the main Southend road (A13) is carried northward over a new railway bridge and a new connecting road eastwards runs over the River Beam to the foundry. In addition to these roads, nearly a mile of new railway-sidings have been constructed for transporting raw materials.

Productivity

The design and layout of the Thames foundry is the result of an exhaustive study by Ford's engineers of all the principal foundries in America, Europe and Britain. This, coupled with the company's 30-years' experience of foundry operations has resulted in a modern "work-flow" foundry, incorporating the maximum degree of mechanization, automation and semi-automation wherever the processes have permitted, thus reducing human effort to the minimum compatible with maximum production output.

Despite periods of national emergency and material shortages, the Thames foundry was built in record time, the first pile being driven in March 1955. The company's own civil engineers were responsible for the buildings and have provided a fine example of modern industrial architecture. This is a venture of which Ford of Dagenham may well be proud and is another facility amplifying the factory's self-contained nature. No other factory in Europe approaches Dagenham in the matter of integration of facilities.

UK Mining Machinery for the Saar

A branch office in the Saar is to be opened on January 1 by Overseas Mining & Engineering Equipment, Limited, 308, Regent Street, London, W.1, which has supplied equipment to Saarbergwerke, Mines de la Saare, of Saarbrucken, for the last three and a half years. It is the company's intention to expand its service.

The company hopes to conduct business in Germany in the near future.

FIG. 3.—*Part of the fettling area on the first-floor of the Thames Foundry; note the air of spaciousness conferred by having much of the equipment suspended from the roof girders.*

Notes from the Branches

Slough

The Slough section of the London branch of the Institute of British Foundrymen were the guests of Trucast, Limited, Farnham Royal, Bucks, for their November meeting. The visit commenced at 4.30 p.m. in the pleasant surroundings of Farnham Royal—if one had not been aware of the fact, it would have been hard to visualize a foundry in such a delightful locality. Light refreshments were enjoyed on arrival before members were conducted over the foundry, where everyone had ample opportunity to inspect the whole process of precision investment casting, from the shop where the pattern-dies were prepared to the inspection of finished castings. The guides were very helpful and explicit in answering all the many and varied questions put to them by their guests, who made up half-a-dozen parties of about seven members each.

On returning from the workshops, the whole assembly enjoyed—or perhaps one should say survived—a very interesting film entitled "Investment Casting and Surgery," presented by Dr. Scales, the eminent orthopaedic surgeon from the Royal Orthopaedic Hospital, Stanmore. This film illustrated how the medical profession and the foundry industry have co-operated to further the science of healing. It depicted the manufacture and fitting of a length of femur bone (which was cast in a cobalt-base alloy) to replace a diseased bone. Amputation would have undoubtedly been necessary if the operation had not been made possible by the founders' ability to produce such a fine casting in a "difficult" alloy. The film, being in colour, made everything appear much more realistic, even if somewhat gruesome to the layman. After giving a commentary on the film, Dr. Scales very kindly answered the many questions put to him by members afterwards. Then, before commencing the evening meeting proper, there was a short break during which refreshments were provided by Trucast, Limited.

Evening Lecture

The evening session began with the section president, Mr. A. R. Parkes, introducing the two lecturers, Mr. L. N. Hocking and Mr. L. N. Smith, who combined to give a lecture in two parts, the former covering "The Relation of Other Casting Processes to Investment Casting" and Mr. Smith dealing with the "Application and Advantages of Investment Casting." Mr. Hocking in his section critically compared a number of different foundry processes—sand, shell, CO_2 and die-casting—taking each one separately and giving the latent points "for and against" and assessing them very fairly in relation to the investment method. Mr. Smith who followed, gave the history, the principle and scope of the process of investment casting operated by Trucast, Limited. Delving into its economics, he pointed out that the saying "accuracy is costly" is unfortunately very true. One point which he emphasized was the call for co-operation between the designer and the foundry; this he felt was important to the investment foundry just as to any other, and perhaps even more so. Some castings were particularly suitable for investment work, while others were not; castings of from 30 lb. to a fraction of an oz. could be made in this way, although the greater proportion of the castings produced were in fact quite small. Both lecturers illustrated their points by showing examples taken from the fine display of hundreds of precision investment castings on exhibition in the lecture room.

An interesting discussion followed, at the conclusion of which, Mr. A. Talbot, the London branch president, who attended the whole function along with a party from the parent branch of the Institute, proposed the vote of thanks to the lecturers, this was seconded by Mr. S. B. Michael. Before closing the meeting, Mr. Parkes, who earlier had thanked Dr. Scales for his part in the proceedings, expressed his appreciation to the directors of Trucast, Limited, for their hospitality and to the staff for making the visit such a great success. Commenting on requests for greater co-operation from designers, Mr. Parkes made the point that components were often designed as castings just because of the foundryman's pre-eminent ability to produce complicated shapes in one piece. There was a danger, he said, if simplification was preached too often to designers that they might find castings were not the best medium in which to reproduce their ideas! In other words, founders should encourage designers to offer them even quite complicated work, but do their best unceasingly to educate them on how to design for the particular casting process chosen and co-operate with them in such a way as to simplify production of their jobs *as castings.*

East Anglia

If there was any doubt about the interest of foundrymen in moulding sand, it was dispelled at the East Anglian section's meeting on November 19. The section was fortunate in having as their speaker for the evening, Mr. W. B. Parkes, of the British Cast Iron Research Association, and his talk "The Effect of Moulding Methods on the Physical Properties of Sand Moulds," presented a subject which is vital to foundrymen, in a new and interesting way, punctuated with Mr. Parkes' characteristic wit. It is true, there has been so much said, written and repeated about sand that foundrymen should know it all, but it is a subject that never seems to pall, and which has an appeal to the practical and academic man.

Mr. Parkes commenced by recalling a question that he had been asked many times—"Is such and such a sand suitable for such and such a casting?" He then explained why, without further information about moulding methods, it was a question which, could not be answered. This led him to explain the difference in permeability, which could be expected between hand moulding and mechanized moulding and the underlying cause—mould hardness. The effect of varying types of machine-moulding methods were next illustrated, and explained, together with graphs, to show the relationship between permeability and mould hardness, and the differences in these factors as between synthetic or semi-synthetic sands and natural sands, was shown.

The author next turned the attention of the meeting to the behaviour of moulds when poured, and explained the formation of scabs, which he said were always $\frac{1}{16}$ to $\frac{3}{32}$-in. thick in a green-sand mould. The formation of scabs depended upon two things—expansion and deformation of the moulding sand—but before these could be fully related and understood, a means for their measurement had to be found. The experiments carried out by the British Cast Iron Association with sand moulds and moulds of olivine were then detailed, and illustrations of "perfect" scabs screened. The results and findings of an apparatus for the heating and high-temperature testing of sand specimens, which had taken the Association five years to develop, were also fully illustrated and explained. The talk was brought to a close by illustration of the effects of wood-flour and other fibrous materials such as asbestos, grass, etc., upon the prevention of scabbing.

A very lively discussion followed and Mr. Parkes ably answered the many questions put to him. Mr. F. Baselow proposed a vote of thanks, which was passed with acclamation.

Cheques—Guidance as to the New Position

By Lord Meston

The Cheques Act, 1957, was passed on July 17, 1957, and came into operation on October 17, 1957. The principal object of this Act is to enable bankers to pay without liability cheques and certain other instruments which are unendorsed or irregularly endorsed.

Historical Origins

Before dealing with the Cheques Act, 1957, in detail it is profitable to trace the history and development of the most interesting document known as the "cheque." The cheque did not suddenly come into existence, it developed gradually from somewhat unusual origins. At one time, wealthy merchants in London deposited their surplus money with the Mint which was then housed in the Tower of London, but, in 1638, Charles I helped himself to some of these deposits, and this rather shook the confidence of the depositors in the merits of the Tower as a safe place for keeping valuables. However, the goldsmiths and jewellers of that time provided themselves with safes and strongrooms, and wealthy merchants and the aristocracy began to deposit their surplus funds with goldsmiths of repute.

The practice grew up of merchants, who had money on deposit, to write an order to the goldsmith instructing him to pay a portion of his deposit to a third party. Later, many goldsmiths developed the business of accepting deposits to the exclusion of the original part of their business, and so we have the origin of the private deposit banks.

For some years before 1853, these "instruments" (*i.e.* the orders to a bank to pay specified sums to a third party) were subject to an *ad valorem* stamp duty. An exception, however, was made for drafts drawn on a banker and payable to bearer on demand. Such drafts, however, had to be drawn within a certain distance of the place where the banker carried on business, and the place of drawing had to be shown on the draft. To avoid the possibility of the drawer omitting to fill in the place of drawing, bankers issued cheque forms printed with the name of the town where they carried on business. These forms bore serial numbers which the bankers used for checking purposes. This practice gave rise to the word "cheque," although it was originally spelled "check."

It will be appreciated that before 1853, in order to avoid the *ad valorem* duty, drafts had to be drawn payable to bearer. If the trader wanted the greater protection afforded by a draft drawn to "order," he had to pay the appropriate duty according to value. This gave rise to a long controversy, and eventually the Stamp Act, of 1853, was passed which reduced the duty on "order" cheques to one penny.

"Crossings"

The next important development was the practice of "crossing" cheques. Bankers had a practice of writing their own names across the face of a draft before sending it on to another banker for payment. This was simply done as a matter of convenience between bankers as indicating the source of presentation. Merchants thought that this procedure was an added protection for their drafts, and accordingly they developed the practice of writing across the drafts the name of the banker where the drawee kept his account. If the name of the banker was not known, only the words "& Co." were written between two lines.

The "cheque" continued to develop in various ways which do not require any special mention, and eventually became included in the Bills of Exchange Act, 1882. By that Act a cheque is defined as a bill of exchange drawn on a banker, payable on demand. The provisions of the 1882 Act wherever suitable are applied to cheques as to bills of exchange.

The relationship between a banker and his customer is one of debtor and creditor. There is a duty on the part of the banker to pay any of the customer's cheques so long as he has sufficient funds to meet them, or the banker has agreed, for value, to an overdraft. If a banker wrongfully dishonours a cheque he is liable to an action for damage for breach of the contract. The customer, on his side, is under a duty to exercise reasonable care in drawing his cheques so as not to facilitate fraud and forgery.

An ordinary open cheque when presented to a bank may, on request, be paid directly across the counter. A crossed cheque may not be paid like this in cash, but must be placed to the credit of the payee's account. Crossings are either special or general and consist primarily of two parallel lines drawn across the face of the cheque. In the case of a general crossing it is customary to add the words "and Co." between the lines. A special crossing is one to which the name of a banker is added between the lines. The cheque must then be paid to that particular banker. If a cheque is crossed "a/c payee" it must be paid into the payee's account at the bank to which the special crossing refers.

Endorsements

In the past much annoyance has arisen from the non-payment of cheques because of technical irregularities in the endorsements. The new Act—and the Cheques Act, 1957—will do much to avoid this unsatisfactory state of affairs. The Act starts by providing that where a banker in good faith and in the ordinary course of business pays a cheque drawn on him which is not endorsed or is irregularly endorsed, he does not, in doing so, incur any liability by reason only of the absence of, or irregularity in, endorsement, and he is deemed to have paid it in due course. A similar protection is extended in the case of certain other documents

Cheques—Guidance as to the New Position

which are not technically Bills of Exchange. Similar protection is conferred on a collecting banker.

The effect of the above provisions is theoretically to make it unnecessary for employees of banks to inspect the reverse side of cheques passing through their hands. In practice, however, while bankers will no longer need to inspect the reverse of cheques presented by their regular customers, it will be necessary to inspect those presented by those unknown to them. Such inspection will also be necessary where cheques are presented by anyone for payment in cash and not merely paid into a bank account.

Evidence of Receipt

The 1957 Act goes on to provide that an unendorsed cheque which appears to have been paid by the banker on whom it is drawn is evidence of the receipt by the payee of the sum payable by the cheque. Apart from the 1957 Act, the position is that an endorsed cheque may always be produced in Court as evidence of the payment of a particular sum of money. The above provisions of the 1957 Act will enable the production of an *unendorsed* cheque to provide similar evidence.

The practice of many people in trade and industry to print receipts on the back of cheques is not likely to be encouraged by the banks. This practice causes the banks increased labour, and it may therefore be that the attitude of the banks in this matter will result in a certain loss of sale of twopenny stamps to the Revenue. The device of printing an "R" prominently on the front of receipted cheques will indicate which ones will require to be examined for the receipt. The use of full receipts, generally stamped on the statement of account, is a convenient practice of most trades which will in no way be altered by the 1957 Act.

The 1957 Act also protects a banker against the true owner of an instrument where the banker collects for a customer who has no title or a defective title. In conclusion, it should be remembered that the new Cheques Act, 1957, applies to dividend and interest warrants and bankers' drafts as well as to cheques.

Textile Machinery Manufacturers' Trading Loss

Group trading loss of £85.632, compared with £220.908 for the previous year, is reported by Fairbairn Lawson Combe Barbour, Limited, textile machinery manufacturers, of Leeds. The process of reorganization is now practically complete and the directors expect the group as a whole to at least break even on trading within a comparatively short period.

Proposals for refinancing came near to completion, but were prevented for the present by the Bank rate increase and the chairman, Mr. W. Walker, looks upon the proposals as "likely to be renewed in other quarters within a reasonable period."

Pattern-stores and Fire Precautions*

Code of Good Practice for New and Existing Buildings

Owing to the presence of unusually large quantities of combustible material—mostly timber—pattern-stores represent a major fire risk. While the value of the materials used in the construction of patterns may not be great, the finished article is often very valuable and quite irreplaceable. It is essential, therefore, to take as many precautions as possible to ensure that these patterns are not damaged or destroyed by fire.

Construction

Buildings designed as pattern-stores should be detached single-storey structures without galleries, having brick walls at least 9-in. thick or walls of reinforced concrete 7-in. thick. Windows should be severely limited in number and should be glazed with wired glass. The floor area should not exceed 10,000 sq. ft. or, alternatively, stores exceeding this area should be subdivided by brick walls not less than 9-in. thick (reinforced concrete, 7-in. thick) passing through the roof, dividing the premises into cells not exceeding 10,000 sq. ft. floor area each.

Lighting should be by electricity only. For inspection of patterns, self-contained portable electric lamps should be used and flexible leads prohibited. If heating be required, it should be by low-pressure hot-water or low-pressure steam (not exceeding 15-lb. gauge pressure). Provision should be made to prevent patterns coming into contact with hot-water pipes. Storage should be limited to a height not exceeding 12-ft.; gangways between racks should be not less than 4-ft. wide and no painting, varnishing or any other processing should be permitted inside the store.

Other Precautions

Windows exposed directly or diagonally within 50 ft. of windows or other openings in any neighbouring building should be prohibited and if such windows exist in a pattern-store already built, it is recommended that they be sealed off, either by bricking up or by the provision of fire-resisting shutters. All doors within 50 ft. of other buildings constructed of timber or similar combustible materials should be "fire-resisting" or, if of wood, they, together with the frames, should be covered with sheet metal fixed over asbestos board.

Automatic sprinkler installations make a valuable form of protection and should be installed wherever practicable in pattern-stores. First-aid fire-fighting appliances should be provided on the basis of one 2-gallon soda/acid or water (gas expelled) extinguisher for every 250 sq. yd. of floor area or part thereof with not less than two extinguishers in any one compartment. Stores should be kept clean and tidy. Floors should be swept frequently and all refuse removed from the buildings regularly. Smoking should be prohibited.

* Extracted from the Fire Protection Association's *Journal*, No. 8.

Equipment & Supplies

Air-operated Lubrication Pumps

A number of high- and low-pressure air-operated pumps, suitable for delivering a wide range of lubricants has been announced by Tecalemit Limited, of Plymouth. The high-pressure pump, T.B.H., has a high pressure ratio of 45:1, which enables a wide range of lubricants to be pumped at any temperature. The air motor is of advanced design and is very economical in air consumption. The construction of the pump mechanism is simple, with a small number of working parts. A fine gauze strainer is fitted which excludes all foreign matter and a special feature is the pump which will not airlock, has extra suction, is non-fouling, and requires a minimum of servicing.

The low-pressure T.B.L., has the same air motor but a pressure ratio of 4:1. This pump is available with float valve for metering and both high- and low-pressure pumps are fitted with an efficient lubricator on the air inlet, which ensures that the working parts of the air motor are kept regularly lubricated. These pumps, which can be dismantled and re-assembled in 15 minutes without special tools, are available to suit 56-lb., 112 to 130-lb. and 400-lb. lubricant packages and for 5, 10 and 44 gallon drums, as well as for bulk tanks and containers.

Extractor Head for Swing-frame Grinders

Dustuctor, Limited, Hayle, Cornwall, now report that their high-velocity, low volume type of dust-extractor* can be adapted to most designs of foundry swing-frame grinders. They claim that it represents an important advance in dust control and protection for foundry workers, since such large machines normally create a great deal of dust. On such installations, the extraction head consists of an elongated duct clamped in position near the trailing edge of the wheel. Its position can be adjusted to allow for wheel wear, and to give optimum placing of the dust-stripping ports. Once fitted it need not be disturbed when changing a wheel and requires only re-adjustment as the grinding wheels wear. The ports are protected against clogging, the heavy particles being deflected by aerofoils while the dangerous respirable dust passes into the extraction duct. Extra ports are incorporated to deal with peripheral dust. The heads are made for the standard wheel diameters in common use and in varying widths. Dust-laden air is extracted through a 2-in. (51-mm.) dia. rubber hose, 250-300 cub. ft. per min. at 5 in. of mercury depression being required for efficient operation.

Laboratory Crusher

Glen Creston, Limited, 41, Church Road, Stanmore, Middx, have introduced a micro-hammer mill for analytical work which will rapidly pulverize small quantities of substances such as coal, coke, stone and slag and anything else that is dry and breaks. It is claimed that within 30 to 120 sec. samples can be pounded to powder by three freely-swinging stainless-steel hammers, the crushed particles passing through a screen into a tranparent plastics tube of 35 ml. capacity. The mill is 10 by 6 by 10 in. long and weighs 10 lb. The standard outfit includes three interchangeable screens (of 1.0, 1.5 and 2-mm. mesh), a stand with 12 transparent plastics tubes and cleaning utensils. The mill is powered by a 100-w. motor of 220 v. a.c./d.c. with a built-in variable resistance which can be used to control the action of the hammers.

* Previously described in this JOURNAL, April 26, 1956, p. 238, August 9, 1956, p. 129, and September 12, 1957, p. 303.

Multi-point Control Valves

Where a number of main control valves are used in the construction of pneumatically- or hydraulically-operated machinery, there arises the problem of providing inter-connecting piping for supply and exhaust connections, particularly where space is limited, and the pipe size is relatively large. Baldwin Instrument Company, Limited, Brooklands Works, Dartford, Kent, have introduced a system which eliminates these connections by grouping the control valves at a central point.

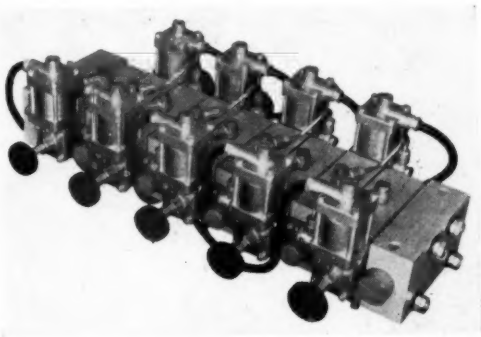


FIG. 1.—*Solenoid-controlled pneumatic valve-unit developed by Baldwin Instrument Company, Limited.*

The valves, which may be fitted with manual, mechanical, electric solenoid or pilot-operating mechanisms, are supplied as a multi-point "packaged unit." Any number of valves, up to a maximum of 12, can be embodied into a single unit. The supply and exhaust ports of all the valves are led into passages running the full length of the assembly, screwed connections being provided in special end pieces, which also provide facilities for mounting the assembly as a whole. Each end block contains one supply and one exhaust tapping, which are common to all valves. Tappings in each individual valve body provide fluid take off points for solenoid pilot heads, where these are used. Each main control valve is therefore an independent unit from the functional point of view.

The simplification which is effected by this type of unit is illustrated by the fact that no fewer than 15 connecting pipes are eliminated in the case of the eight-bank solenoid-controlled pneumatic unit which is shown at Fig. 1. At the present time, these "packaged units" are available in the ¼-in. bore 4-way pattern only. If any of the points are required for 3-way working only, the unused connection is plugged.

The Dohm Group of Victoria Street, London, have announced the marketing of a lagging material of plastic dough, supplied in powder form, which can be applied quickly and effectively even by amateurs. The trade name of this is "Warmlag" and it is available in 5-lb. polythene packs, price 4s. A thin undercoat is dabbed on first. This is followed, when the surface is dry, by a final coat.

Book Reviews

Manufacturing Processes (fourth edition) by M. L. Begeman. Published by Chapman & Hall, 37, Essex Street, London, W.C.2; price 64s. net.

It is becoming increasingly evident, if productivity is to be increased, that when technologists are considering the merits of various production processes for the fabrication of new products, there must be a more general awareness, not only of the potentialities of available metallic and non-metallic materials, but also of the production techniques capable of being employed with them.

Because of the immensity of the field, the general tendency has been, and still is, for the scope of most textbooks on manufacturing processes to be restricted to a specific field of interest, such as powder metallurgy, casting production, gear-cutting, press-work, etc. This for some readers, tends in part at least, to obscure the picture and it is therefore refreshing to read this book, which attempts—even if in a somewhat general manner—to review all the important manufacturing processes.

Some idea of the breadth of treatment of this book can be obtained by noting the chapter headings, *viz.*: Manufacturing processes; foundry equipment and procedures; patterns for castings; melting and casting metals; special casting methods; heat-treatment of steel; powder metallurgy; plastics; welding; electroforming and coating processes; hot-working of metal; cold-working of metal; press work; inspection; metal-cutting lathes, turret and automatic lathes; threads and thread cutting; shapers; planers, drilling and boring machines, milling machines and cutters, gears and gear-cutting machines; metal sawing; broaching machines and tools; abrasives, grinding wheels and grinding machines.

The text is well printed and fully illustrated. Each chapter concludes with a number of review questions and a list of literature references, although it will be noted with regret by British readers that these are predominantly of American origin. This book can be recommended as giving a valuable survey of modern manufacturing processes, and as such will be consulted not only by students but also by those engaged in production.

J. E. GARSIDE.

Die Viskosität metallischer Schmelzen (Viscosity of Liquid Metals) (in German), by Dr. Tung-ping Yao. Published by Westdeutscher Verlag, 1/3, Ophovener Strasse, Opladen, Germany; price 14.40 D.M.

After discussing previous work on the theory of the structure of liquid metals and on viscosity, the author deals with the measurement of this property and describes the oscillating crucible and oscillating ball apparatus which he used. In calibrating the former, he found that the relationship between viscosity and logarithmic decrement of vibration amplitude had a maximum. The viscosity of the elements tin, cadmium, zinc, aluminium, lead and antimony were determined at various temperatures down to the freezing points. The results showed a sudden rise in viscosity near to the freezing point, but in undercooled melts this did not occur until the end of undercooling. High viscosity values near to the freezing point and immediately on melting are considered to be due to nucleation, atomic ordering and lattice residues. Finally, the author gives an interesting discussion of the relationship between viscosity and the atomic structure of metals.

The report is well illustrated and should interest those foundrymen requiring to understand the fundamental properties of liquid metals. The text is easy to follow, which fact is perhaps not disconnected with Dr. Yao's earlier training in England.

H. MORROGH

New Catalogues

Roller Conveyors. List No. 302, issued by J. Collis & Sons, Limited, Regent Square, Gray's Inn Road, London, W.C.1, is an informative and well-presented publication which describes, illustrates and gives detailed specifications of the company's line of roller conveyors known by the trade name of RolaVeyor. The range for both straight and curved sections has been kept to a reasonable size, capable of serving many applications. A popular type shown uses light-alloy sections; these are very convenient for handling when it is necessary to re-rout a process. In the centre-spread, dealing with actual applications of the RolaVeyor, no less than one third of the illustrations show castings or moulds being transported. The catalogue also describes and illustrates the firm's TransVeyor, a table in which 36, 1-in. dia. balls (each cradled on 100 balls in a hemi-spherical housing) are mounted, the purpose being to facilitate slewing of moulds, coreboxes or crated items.

Sand Testing. Foundry Suppliers, Limited, 25a, Cockspur Street, London, S.W.1, have issued a new edition of their catalogue covering the sand-testing apparatus made by George Fischer of Switzerland. It differs from earlier editions inasmuch as it describes and illustrates machines which have been changed over to British sand-testing specifications. The standard of publicity attained is particularly high—the clarity of the photographs reproduced being of outstanding merit.

Coated Abrasive Belts. The Norton Grinding Wheel Company, Limited, Welwyn Garden City, Herts, have despatched to those on their mailing list a booklet on "Tips on the Use of Coated Abrasive Wheels." The "tips" contain several excellent ideas for setting up and for storage of belts, one of which includes the use of clothes-pegs. The hints are amusingly illustrated—indeed, the adjective *risqué* could be applied to a certain illustration.

Dry-film Lubricants. A leaflet received from the Stedall Machine Tool Company, 145-157, St. John Street, London, E.C.1, sets out the claims made for a lubricant based on resins blended with graphite, metallic salts and molybdenum di-sulphide. The ironfounding industry alone is spending £10,000,000 per year on maintenance, so lubricants must figure as a quite important item of the total spent by the whole industry.

Small Component Melting and Casting Machine. W. J. Hooker, Limited, 239a, Finchley Road, London, N.W.3, have issued a four-page leaflet to announce the Radyne "Hookercaster" model S30. The machine* is a combination of a high-frequency melting furnace with a centrifugal casting machine, and it is claimed that the new model will produce between 2,000 and 6,000 castings a week and handle a weight range running from 4 to 8 oz.

* The basic design was described in this JOURNAL, March 21, 1957, p. 366.

Mr. T. W. MCCULLOUGH has been appointed Chief Inspector of Factories in succession to Sir GEORGE BARNETT, who retires on December 31.

Company News

SIDNEY FLAVEL & COMPANY, LIMITED, gas appliance manufacturers, of Leamington Spa—Group net profit for the year ended July 31, 1957, was £18,978, which compares with a loss of £35,935. As last year there is no dividend.

PLATT BROS. & COMPANY (HOLDINGS), LIMITED, textile-machinery manufacturers, of Oldham—The company has acquired a controlling interest in Epsylon Industries, of Feltham (Middx), the directorate of which remains the same.

BUTLER MACHINE TOOL COMPANY, LIMITED—With its unchanged 17½ per cent. dividend, the company announces an additional 2½ per cent. bonus for the year ended September 30, 1957. Subject to CIC consent, a one-for-two scrip issue is proposed. Net profit of £79,640 compares with £46,859.

THOMAS BLACKBURN & SONS, LIMITED, structural and general engineers and ironfounders, of Preston—In announcing its preliminary figures recently, the company incorrectly gave the group trading profit as £51,055 (£82,055). This should have read £55,578 (£66,855). No other figures are affected.

DELTA METAL COMPANY, LIMITED—The offer to acquire the remaining ordinary shares in Sanbra, Limited, has been accepted by over 90 per cent. of the shareholders. The final date for acceptance is being extended to December 17, holdings then outstanding will be acquired under the Companies Act.

METAL INDUSTRIES, LIMITED—Profit rose to £719,000 (before tax) for the 24 weeks ended September 14, compared with £543,000 for the corresponding period of 1956, and this improvement gave grounds for sober satisfaction, states the chairman, Sir Charles Westlake. Present economic conditions, however, might well influence the full year's figures.

FAIRBAIRN LAWSON COMBE BARBOUR, LIMITED, textile-machinery manufacturers, of Leeds—The company incurred an operating loss of £85,632 in the year ended March 31, 1957, after bank interest and depreciation, etc. The previous year's deficit was £220,908. The net deficit is £30,530 (£138,744). For the third successive year there is no dividend.

LE GRAND, SUTCLIFF & GELL, LIMITED, well drillers and oilfield equipment manufacturers, of Southall (Middx)—The offer of Platt Bros. & Company (Holdings), Limited, for the ordinary shares of the company which it does not already own has been accepted by holders of over 90 per cent. in value of the outstanding shares and has been made unconditional.

STEWARTS AND LLOYDS OF SOUTH AFRICA, LIMITED—Results of manufacturing departments continue to be satisfactory and the branch turnover increased during the year to June 30, 1957, when group sales were £14,646,918 (£13,151,811). With investment income and sundry credits, the total profit is £1,481,354 (£1,372,254). The ordinary dividend is 20 (17½) per cent.

HALE & HALE (TIPTON), LIMITED, malleable iron founders, of Tipton (Staffs)—The directors have considered the matter of a scrip issue, but do not favour taking action in this particular channel at present. This will be the subject of further consideration. Group net profit for the year to August 4 1957, was £31,919 (£38,075), and the ordinary dividend is 25 per cent. (same).

DEWHURST & PARTNER, LIMITED, electric control equipment manufacturers, of Hounslow (Middx)—An increased final dividend of 15 (12½) per cent., making with the higher interim a total of 20 per cent., against 16¼ per cent., on the £360,000 one-class capital, is announced for the year to September 30, 1957. Before tax of £157,134 (£128,898) the profit was £306,493 (£252,657).

T. M. BIRKETT, BILLINGTON & NEWTON, LIMITED, non-ferrous founders and engineers, of Hanley, Stoke-on-Trent—The final dividend is 12½ per cent. for the year ended July 31, 1957, on capital increased by a three-for-five scrip issue. Last year's final was 20 per cent. on the old capital. The interim was 5 per cent. paid before the capital increase (same). Net profit is £21,430 (£39,027), after tax of £34,740 (£51,420).

JOSEPH LUCAS (INDUSTRIES), LIMITED—Further expansion took place in the overseas business and it is estimated that directly and indirectly more than one half of production goes for overseas use. At the present time this approaches £1,000,000 a week. Despite setbacks in some sections, group trading surplus expanded to £5,622,381 (£5,010,441). The dividend is maintained at 7½ per cent. and there is a 3d. per £1 ordinary share capital distribution.

J. BROCKHOUSE & COMPANY, LIMITED, dropforgers, ironfounders, etc., of West Bromwich (Staffs)—The dividend is raised by 1 per cent. to 8½ per cent. Net trading profits are £1,079,477 (£971,938), divided as to £841,216 (895,737) from home companies and £238,261 (£76,201) from overseas interests. During the past four years over £1,750,000 has been spent on capital improvements, partly financed by realization of non-profitable assets and partly from retained profits and depreciation.

VOKES, LIMITED, filtration and silencing engineers, of Guildford—A satisfactory order-book contains a large proportion of work for atomic energy projects. Consolidated trading profits, including those of Stream-Line Filters, Limited, as from October, 1956, expanded to £483,623 (£391,142). Due to heavier taxation, which absorbs about 92 per cent. of Stream-Line profits, group net profit is little more than £8,000 higher at £165,302. The dividend is repeated at 25 per cent. on greater capital.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

EPPINGHAM, NORFOLK, December 23—Supplying and laying approximately four miles of 4-in. dia. cast-iron water main and incidental works at Weybourne and at Upper Sheringham, on fixed price basis, for R.D.C. Documents from the consulting engineers, J. C. Melliss & Company, 110, Horseferry Road, London, S.W.1. Deposit £2 2s. 0d.

PHILLIPINES, January 29, 1958—55,600 kva. generator and appurtenances. (ESP/27938/57.)

UNION OF SOUTH AFRICA, December 12—Laboratory standard wattmeter. (ESB/28372/57.)

UNION OF SOUTH AFRICA, December 13—Airless shot-blast, tumbler-type, cleaning machine. (ESB/28344/57.)

THE INDIAN GOVERNMENT is expected to have the report of the British shipyard mission by next March. The mission has ended its tour of possible sites for India's second shipyard, and its leader, Mr. James Lenaghan, a director of the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, said in New Delhi, that eight possible sites were seen. He said the report would cover the establishment of a shipyard capable of building ships from 10,000 to 60,000 tons.

Personal

Mr. H. R. GIBBS, principal surveyor for Scotland, of Lloyd's Register of Shipping, has been appointed a director of Barclay Curle & Company, Limited, Glasgow.

Mr. M. J. PARSONS and Mr. C. A. SHERLOCK have been appointed to the board of Lea-Francis Cars, Limited. Mr. Parsons will continue as secretary to the company.

Mr. C. J. STADDON, has relinquished his appointment with McLellan & Partners to join Miles & Partners (London) Limited, consulting engineers, of 76, Cannon Street, London, E.C.4, in their electrical-engineering department.

For many years company secretary and a director of the Newall Engineering Company, Limited, Peterborough, Mr. ERNEST VALDES has retired after 44 years' service. He has been presented with a radio set from his colleagues.

Mr. BRIAN A. GOMM, assistant liaison executive in India for F. Perkins, Limited, has been appointed general manager of F. Perkins (S.A.) (Pty.). He succeeds Mr. NORMAN RADLEY, director and general manager, who is leaving the S.A. company.

Dr. W. P. MANSFIELD has been appointed director of research of the British Internal Combustion Engine Research Association as from March 1, 1958. He will succeed the first director of the Association, ENGINEER REAR-ADMIRAL D. J. HOARE, who is retiring.

Mr. A. F. BURKE has been appointed deputy chairman of de Havilland Holdings, the parent company of the de Havilland group. He is chairman of the de Havilland Engine Company, Limited and managing director of the de Havilland Aircraft Company, Limited.

Mr. WILLIAM B. JOHNSTONE, a director of Alex. Stephen & Sons, Limited, shipbuilders, of Glasgow, has been elected to the Scottish board of Lloyd's Register of Shipping in place of the late Mr. H. M. Macmillan, who was chairman and managing director of the Blythswood Shipbuilding Company, Limited, Glasgow.

After he had presented awards to 35 apprentices of Laycock Engineering, Limited, Sheffield, Mr. H. E. HILL, chairman of the company and of Birfield Industries, Limited, the parent company, received a gift of a steel deed box. It was presented by the firm's newest apprentice, who explained that the boys had made it themselves.

Mr. L. S. MARLER, Mr. S. E. PRYOR, Mr. H. C. DEBENHAM and Mr. R. D. READ have been appointed directors of Dobson & Barlow (Securities) Limited. Mr. R. W. J. OVERLAND and Mr. A. DICKINSON have resigned from the board. Russell Tillett & Company have been appointed secretaries in place of Mr. J. N. NISNER, who has resigned.

Mr. J. W. PLOWMAN (Dewrance & Company, Limited) has been elected chairman of the British Valve Manufacturers' Association for the year 1957/58. The retiring chairman, Mr. N. P. Newman (Newman, Hender & Company, Limited), has been elected vice-chairman. The other members of the executive committee for the year 1957/58 are:—Mr. D. Bailey (Sir W. H. Bailey & Company, Limited); Mr. F. T. Bintcliffe (J. Blakeborough & Sons Limited); Mr. F. Burgess (Whites-Nunan, Limited); Mr. G. F. Chambers (Bryan Donkin Company, Limited); Mr. A. E. Dickinson (Smith Bros. & Company (Hyson), Limited); Mr. D. S. Gardner (Glenfield & Kennedy, Limited); Mr. H. L. Hammond (Crane, Limited); Mr. K. M. Leach (Audley Engineering Company, Limited) and Mr. A. L. Trump (Saunders Valve Company, Limited).

Mr. ERIC MENSFORTH, managing director of Firth Brown Tools, Limited, Speedicut Works, Sheffield, presented trophies at the annual prizegiving of apprentices of the firm on November 22. The apprentice training trophy for the most outstanding apprentice went to 18-year-old J. I. HAWLEY, commercial apprentice, who has just completed his ordinary national certificate course in commerce and is now studying for the higher national certificate. A new award, the Foreman's Bowl, offered by the foremen of the company for the under-18 apprentice who has shown most progress in the works towards craftsmanship was presented to 16-year-old BRIAN COUSINS, by Mr. Fred Crookes, a foreman. Mr. K. WAINWRIGHT, assistant labour manager and apprentice supervisor, said the development of the right relationships between apprentices and management was of the utmost importance.

Obituary

Mr. W. R. LOGIE, founder of Logie, Ashmole & Company, Limited, engineers, of New Street, Burton, has died at the age of 94.

Dr. ERNEST MUELLER, a director of Britannia Iron & Steel Works, Limited, Bedford, who recently retired from the post of chairman, has died suddenly at his home in Switzerland. He was also vice-president of the Swiss company, George Fischer, Limited, which is associated with the Bedford company.

At a recent meeting of the East Anglian section of the London branch of the Institute of British Foundrymen, the section president, Mr. R. E. Berry, paid tribute to Mr. PARRY of the Ipswich Civic College, who died suddenly last month. Mr. Parry was a great friend of the section and a regular attender of its meetings.

Recent Wills

HOWARD, G. F., chairman of Spear & Jackson, Limited, steel and tool makers, etc., of Sheffield ... £16,927

BEEBY, A. J., managing director of Alexander Beeby & Son, Limited, coal merchants, of Peterborough ... £19,940

TITLER, J. D., chairman and managing director of the Airscrew Company & Jicwood, Limited, Weybridge (Surrey) £77,306

CHAMBERS, EDWIN, managing director of Edwin Chambers, Limited, manufacturers of portable gas ovens, of Bradford £46,113

CHRYSTAL, W. A. C., joint managing director of British Chrome & Chemicals, Limited, and a director of other companies £240,045

DUNKLEY, J. A., of New Whittington, Chesterfield, formerly for over 50 years at Staveley Iron & Chemical Company's Old Works foundries £2,452

WILLIAMS, T. H., former mill manager and chief roll designer at the Cargo Fleet Works of the South Durham Steel & Iron Company, Limited ... £8,060

BROWN, RONAL, deputy chairman and managing director of Scotts' Shipbuilding & Engineering Company, Limited, Greenock, personal estate in England and Scotland £84,821

LOUDEN, JOHN, chairman of Pegler & Louden, Limited, brassfounders, of Glasgow, the oldest living past president of the Iron, Steel and Ironmongery Benevolent Association of Scotland ... £35,029

STOKES, R. R., Labour MP for Ipswich since 1938, a former Minister of Works and Lord Privy Seal, chairman and managing director of Ransomes & Rapier, Limited, engineers and ironfounders, of Ipswich £91,797

BENNETT, LORD, joint managing director and former chairman of Joseph Lucas (Industries), Limited, former president of the Federation of British Industries, late director of Imperial Chemical Industries, Limited £312,353

Smoke Control Orders

With the exception of West Bromwich, no objections have been received to five orders for the creation of smoke control areas under the Clean Air Act, 1956, which have been confirmed by the Minister of Housing and Local Government. The other areas are Bolton, Denton (Lancs), Hayes and Harlington (Middx), and Ossett (Yorks). All the orders come into operation during 1958.

West Bromwich householders have objected on the grounds that smoke nuisance from industry and the railways should be reduced first; that coke fumes in houses suffering from downdraught were dangerous to health; and that the cost of replacing or adapting fireplaces to burn smokeless fuels would cause financial hardship to people on small fixed incomes.

The Minister has replied that the domestic chimney was as much a contributory cause of air pollution as the industrial chimney; coke fumes were not more harmful than coal fumes; adapting and replacing fireplaces to burn coke ranked for a grant of not less than 70 per cent. and in special circumstances the corporation could pay more.

Non-ferrous Foundries Report

In the House of Commons last week the Parliamentary Secretary to the Ministry of Labour, Mr. Robert Carr, told Mr. Frank Allaun (Lab.) that he was unable to say when decisions were likely to be reached regarding draft regulations based on the report of the Joint Standing Committee on Conditions in Non-ferrous Foundries.

Was it surprising that foundrymen were asking why the Minister acted so slowly, said Mr. Allaun. The committee was set up four years ago and this was the third question of vital importance to foundry workers which had been raised in the last three weeks, the reply in each case being unsatisfactory.

Mr. Carr replied that there were no less than 86 recommendations in the report and even when issues of substance had been resolved, the actual drafting would not be a simple matter. The reports could not be rushed through too quickly because many consultations had to take place.

Founders Object to Gas Works Proposal

Sheepbridge Engineering, Limited, Chesterfield, has objected to the Ministry of Housing and Local Government against a proposed coal carbonization plant of the Staveley Iron and Chemical Company, Limited, next to their works; the plant would provide employment for about 200 men. Chesterfield Corporation Town Planning Committee has deferred consideration of the scheme.

Mr. Tom Brown, managing director of Sheepbridge Engineering, Limited, is reported to have told a gathering of senior staff and foremen that if the protests already made about the proposed plant did not avail he was prepared to move the engineering works to an alternative site rather than work in the shadow of a gas works. He is reported to have said that an alternative was Halesowen in Worcestershire where the firm already has a factory.

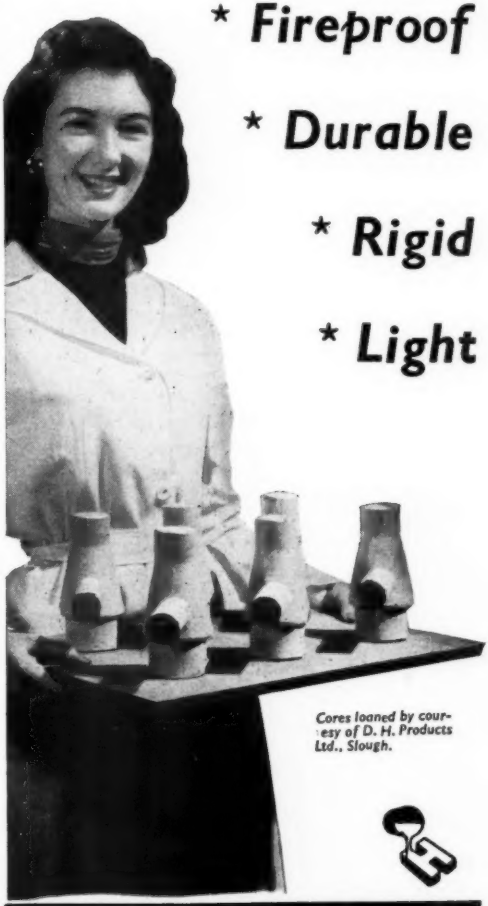
PETO SCOTT ELECTRICAL INSTRUMENTS, LIMITED—Mr. Arthur T. Black has been appointed to the board.

GLOBE PNEUMATIC ENGINEERING COMPANY, LIMITED—Mr. F. E. J. Howard, works manager, has been appointed a director.

HOOKERLITE CORE TRAYS

are

* Economical
* Fireproof
* Durable
* Rigid
* Light



Cores loaned by courtesy of D. H. Products Ltd., Slough.

W. J. HOOKER LTD.
239a FINCHLEY ROAD, LONDON, N.W.3
Phone: Swiss Cottage 3281-2-3

Forthcoming Events

DECEMBER 7

Institute of British Foundrymen

West Riding of Yorkshire branch: "Sub-committee TS.43 Report on Modern Cupola Developments," by Dr. G. S. Shaw, 6.30 p.m., at the Bradford Institute of Technology.

DECEMBER 9

Purchasing Officers' Association

London branch: "Widening the Scope of Purchasing in Europe," by C. Huebner, 6.45 p.m., at the Royal Society of Arts, John Adam Street, Strand, W.C.2.

Institution of Production Engineers

Leeds section: "High Cost of Low Overheads," by C. H. Starr, 7 p.m., at the Hotel Metropole, King Street.

DECEMBER 9 to 10

Institute of Metals

Symposium on "Vacancies and other Point Defects in Metals and Alloys," arranged by the Metal Physics Committee, at the Atomic Energy Research Establishment, Harwell.

DECEMBER 10

Purchasing Officers' Association

North Lancashire branch: Film "Calder Hall Power Station," and "Recent Trends and Developments in Electricity Generation." by E. A. Scholes, 7.30 p.m., at the Chamber of Commerce, Fishergate, Preston.

Institution of Production Engineers

Peterborough section: "Problems in Mechanical Handling and Some Answers," by W. T. Druit. 7.30 p.m., at the Peterborough Technical College, Eastfield Road.

Institute of British Foundrymen

Coventry and district section: "Recent Developments in High-production Foundries," by J. D. Berry, 7.30 p.m., at the Coventry Technical College, Room A.5.

Institution of Works Managers

Sheffield branch: "Education of Boys in Industry," by D. R. O. Thomas, 7.30 p.m., at the Grand Hotel.

Institute of Metals

South Wales local section: "Hardness of Metals," by D. Tabor, PH.D., 6.30 p.m., at the Department of Metallurgy, University College, Singleton Park, Swansea.

Incorporated Plant Engineers

Manchester branch: "Budgetary Control," by G. F. Bright, 7.15 p.m., at the Engineers' Club, Albert Square.

Sheffield Metallurgical Association

"Some Everyday Refractory Problems," by Dr. P. W. Clark, 7 p.m., at the British Iron and Steel Research Association Laboratories, Hoyle Street.

DECEMBER 11

Institute of British Foundrymen

Birmingham branch: Reading of papers entered for Short Paper Competition, 7.15 p.m., at the College of Technology.

London branch: "Properties of Castings in Copper-base Alloys," by F. Hudson, F.I.M., 7.0 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2. (Joint meeting with the London local section of the Institute of Metals.) (Members should note the earlier start.)

Institution of Production Engineers

Edinburgh section: "Hydraulics," by F. B. Levetus, 7.30 p.m., at the North British Hotel, Princes Street.

Incorporated Plant Engineers

East Midlands branch: "Mechanical Handling," by A. E. Holmes, 7 p.m., in the Sherwood Room, County Hotel, Theatre Square, Nottingham.

Western branch: "Air Compressors," by A. H. Bailey, 7.15 p.m., at the Grand Hotel, Bristol.

North-East Metallurgical Society

"Stress-corrosion Cracking," by T. P. Hoar, M.A., PH.D., 7.15 p.m., at the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.

Institute of Physics

Scottish branch: "Lord Kelvin," by Professor P. I. Dee, C.B.E., 7 p.m., at the Royal Philosophical Society of Glasgow, 207, Bath Street. (Joint meeting with the Royal Philosophical Society.)

Purchasing Officers' Association

Coventry branch: "Testing of Materials," by J. E. James supported by A. E. Bray, 7.30 p.m., at the Craven Arms, High Street.

Worcestershire group: "Productivity and Production," by J. Foster Vevers, 7.30 p.m., at the Lecture Room of Heenan & Froude, Limited, Worcester.

Combustion Engineering Association

Northern region:—"Burning of Difficult Fuels," by E. J. Macdonald, 10.30 a.m.; at 2.30 p.m. "Methods of Smoke Measurement and Control," by G. Nonhebel, at the Metropole Hotel, Leeds.

DECEMBER 12

Institution of Works Managers

London branch: "Some Tentative Concepts on the Subject of Management and Administration," by W. Brown, 7 p.m., at the Royal Society of Arts, John Adam Street, Adelphi, W.C.2.

Institute of British Foundrymen

Beds/Herts section: "S.g. Iron—A Versatile Engineering Metal," by W. W. Braidwood, 7.30 p.m., at the Assembly Room, Town Hall, Luton.

Southampton Metallurgical Society

"Creep," by E. A. G. Liddiard, M.A., F.I.M., 7.15 p.m., at Southampton University.

Incorporated Plant Engineers

Merseyside and N. Wales branch: "Heating and Ventilation"—a discussion led by H. S. Crump, 7.15 p.m., at the Exchange Hotel, Liverpool.

DECEMBER 13

Institute of Physics

Manchester and district branch: "Strength of Materials—with special reference to Metals," by Dr. A. H. Cottrell, F.R.S., 6.45 p.m., at the Bragg Lecture Theatre, University of Manchester.

Institution of Production Engineers

Ipswich and Colchester section: "Review of Methods for Heating and Ventilating Factories," by F. Carter, 7.30 p.m., at the Golden Lion Hotel, Cornhill, Ipswich.

DECEMBER 14

Institute of British Foundrymen

Newcastle branch: "Patterns from the Moulder's Point of View," by L. Bell, 6 p.m., at the Neville Hall, Westgate Road.

Scottish Branch: "Limited Mechanization of Green-sand Castings for Small Output," by W. Y. Buchanan, 3 p.m., at the Royal Technical College, George Street, Glasgow.

Increases in Capital

SPENCER WIRE COMPANY, LIMITED, Wakefield, increased by £500 000, in £1 ordinary shares beyond the registered capital of £530,000.

D. T. BROWN & COMPANY (STEEL), LIMITED, Liverpool, increased by £10,000, in £1 ordinary shares, beyond the registered capital of £15,000.

MICHELL BEARINGS, LIMITED, Newcastle-upon-Tyne, increased by £50,0.0, in £1 ordinary shares, beyond the registered capital of £150,000.

UNITED STEEL COMPANIES, LIMITED, Sheffield increased by £20,000.000, in £1 unclassified shares, beyond the registered capital of £30.000,000.

GENERAL DESCALING COMPANY, LIMITED, London, S.W.1, increased by £10 000, in £1 non-founders' shares, beyond the registered capital of £20 000.

WILLMOTT-FLETCHER, LIMITED, electrical and general engineers, etc., of Evesham, increased by £10,000, in £1 shares, beyond the registered capital of £10.000.

SIMCOMATICS, LIMITED, machinery manufacturers, etc., of Liverpool, increased by £10.000. in £1 ordinary shares, beyond the registered capital of £15,000.

ALLEN WEST & COMPANY, LIMITED, electrical and mechanical engineers, etc., of Brighton, increased by £500.000. in 5s. ordinary shares, beyond the registered capital of £2.000 000.

MARRISON & CATHERALL, LIMITED, iron, steel, and non-ferrous metal, etc., manufacturers, of Kilamarsh, near Sheffield, increased by £145,000. in £1 unclassified shares, beyond the registered capital of £5,000.

TWW

foundry supplies & sundries

MOULDERS' SUNDRIES . FOUNDRY COKES and COAL DUST . PIG IRONS, FOUNDRY and FORGE MOULDING SAND . GANISTER LIMESTONE and FLUORSPAR . BRUSHES, SIEVES and RIDDLES . TONGS, SHANKS and LADLES. These, and all items connected with the Foundry Trade, can be supplied by Wards' FOUNDRY SUPPLIES DEPARTMENT.

★ *Write for a copy of our booklet — "Foundry Equipment and Supplies."*

THOS. W. WARD LTD · ALBION WORKS · SHEFFIELD

TELEPHONE 26311 (22 LINES) · TELEGRAMS "FORWARD SHEFFIELD"

LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

FS/29.

News in Brief

THE ADVANCE FOUNDRY COMPANY, 107, Seminary Avenue, Dayton, Ohio, USA, announce that their new telephone number is CL 3-4148.

A SYMPOSIUM on nuclear energy, sponsored by the Institution of Chemical Engineers, is to be held at the Hoare Memorial Hall, Church House, London, S.W.1, on Tuesday, January 21, 1958. Details are available from the secretary of the Institution, 16, Belgrave Square, London, S.W.1.

HERBERT MORRIS, LIMITED, engineers, Loughborough, has paid a special bonus of one week's standard pay to all employees who have been continuously on the firm's payroll since August 1956. A gratuitous payment has also been made to long-service employees who retired during the financial year.

IT HAS NOW BEEN DECIDED to hold the Indian Foundry symposium on "Recent Developments in Foundry Technology" (February 5-8, 1958) at the United Club Auditorium, "C" Road, Jamshedpur. Professor M. S. Thacker, director general for Scientific and Industrial Research, New Delhi, has kindly consented to inaugurate the event.

EXTENSIONS to Rotherham College of Technology are to cost £463,240, and Rotherham Education Committee learned, on November 25, that the Ministry of Education has given approval to the spending of that sum. Consent has also been received for the raising of a loan; this sum does not include furnishings, equipment and apparatus.

LEEDS FIRECLAY COMPANY, LIMITED, state that the work on the first stage of their new refractory plant, while progressing according to the original schedule, will be delayed in completion because of the revised dates of delivery of certain units of plant. It was due to be finished in March or April 1958, but will not now be completed until July.

CLAYTON SON & COMPANY, LIMITED, engineers, have recently completed at their Pepper Road Works, Hunslet, Leeds, a splitter-tower for the new Fawley oil refinery at Southampton. Weighing 14 tons, of 8-ft. 6-in. dia. and 60-ft. long, the splitter-tower is the first of its kind to be made in the Leeds district. It left Leeds on a special lorry under police escort on its three-day journey to Southampton.

AN AGREEMENT between the United Kingdom and the European Coal and Steel Community on iron and steel tariffs, which was signed in Luxembourg on November 25, embodies the proposals for the reduction of iron and steel tariffs approved by the Council of Association between the United Kingdom and the European Coal and Steel Community at its meeting on October 24. The agreement will be published and laid before Parliament shortly.

WORK HAS STARTED on the first stage of the £1,250,000 five-year expansion plan for the Solartron Electronic Group, Limited, at Farnborough (Hants). The first section of the final 350,000-sq. ft. building will be ready for occupation by next August and will house comprehensive manufacturing facilities in the fields of electronics, electro-mechanics, hydraulics, and pneumatic and precision mechanical engineering. The manufacture of electronic instruments will remain at the Thames Ditton and Kingston factories.

THE ANNUAL DINNER of the Midland section of the Institute of Vitreous Enamellers is to be held at the Station Hotel, Dudley, on February 7, 1958, commencing at 7.15 for 7.30 p.m. Arrangements have also been made for a theatre party on February 28, which will commence with cocktails at 6. p.m. at the Station Hotel, followed by dinner at 6.30 p.m. after which the party will go to the Dudley Hippodrome for the 7.15 p.m. performance of "Cinderella." Applications to attend the theatre party should reach the secretary of the Institute not later than January 11, and for the dinner the latest date is January 28.

A METEORITE for a new metallurgical laboratory, which is being set up by the British Iron and Steel Federation for the South Kensington Science Museum, has been successfully cut in half by the works development department of the English Steel Corporation, Limited, Sheffield. The meteorite came from the collection of 850 possessed by the Natural History Museum. It weighed 300 lb. and was found near Henbury in central Australia in 1931. To avoid overheating during the job, compressed air blast was used for cooling. The meteor was halved by a bandsaw and then two slices, each ½-in. thick, were cut from the centre.

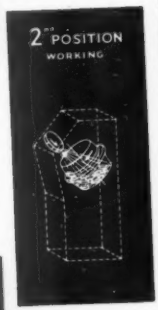
THE INSTITUTION OF PRODUCTION ENGINEERS announces that the 1957 Viscount Nuffield paper will be presented to the Institution by the Rt. Hon. the Lord Hives, C.H., M.B.E., D.SC., LL.D., who retired from the chairmanship of Rolls-Royce, Limited, in January last. His subject is "Technical Education for Production Engineers." The paper will be presented at a meeting to be held in the University of Bristol on February 6, 1958, commencing at 6.30 p.m. Admission to the meeting, which is open to all members of the Institution and visitors (subject to accommodation being available), will be by ticket only, and early application is advisable. Tickets may be obtained from the secretary of the Institution at 10, Chesterfield Street, London, W.1.

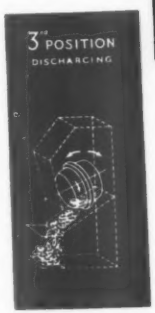
A RECOMMENDATION that a permanent technical liaison service to help manufacturing and engineering firms with their problems be set up immediately in Scotland is made by a committee of the Scottish Council (Development and Industry). Lord Polwarth, chairman of the Council, said: "Such a service is vital to the development of our industries which depend on technical knowledge." He was speaking at the Council's offices in Edinburgh on November 28 when the report, a 174-page volume prepared by the Council's technical liaison survey committee, was the subject of a Press conference. The survey has been carried out by a team of three professional men who alleged that in Scotland there existed a serious lack in the present system of meeting the technical and organizational requirements of a large number of firms.

PROFESSOR PAUL BASTIEN, scientific director of the Etablissement Schneider and of the *Société des Forges et Ateliers du Creusot* gave the 10th Hatfield Memorial Lecture in Sheffield, on November 28, on the mechanism of the formation of banded structures in steel. He was introduced by the vice-chancellor of the university, Dr. J. M. Whittaker, and thanked by Dr. H. H. Burton. In the afternoon there was an attendance of nearly 200 at the joint meeting of the Iron and Steel Institute, the Sheffield Society of Engineers and Metallurgists, and the Sheffield Metallurgical Association. Two papers on the elimination of the cavity that may develop in an ingot as it cools by the improved refractory feeder-heads, were prepared by Mr. G. Fenton, Mr. H. S. Marr and Mr. W. H. Glaisher, and another on high-boron alloy steels needed for the control rods of atomic energy reactors by Mr. T. H. Middleham, Dr. J. R. Rait and Mr. E. A. Colbeck of the research department of Hadfields, Limited.

BAKER PERKINS Shot Blast Equipment

Rotating Barrel Shot-Blast Machine





BAKER PERKINS LTD
Engineers
WESTWOOD WORKS – PETERBOROUGH

Raw Material Markets

Iron and Steel

Up to recently producers of pig-iron had little difficulty in disposing of the major portion of their outputs, the steelworks alone absorbing over three-quarters of the total outputs and imports were needed to make up their full requirements. These demands called for maximum outputs from the furnaces producing basic steelmaking pig-iron, including a number which were changed over from other grades of iron, and record tonnages were obtained up to the end of October. An increase of over 1,000,000 tons for the first 10 months of the year compared with the corresponding period last year was recorded.

There is now, however, some change in the position. With heavy stocks on hand and declining demands the call for supplies from the steelworks has dwindled and outputs from home furnaces will be on a decreasing scale by the closing down of some furnaces and reduced outputs from others. It is also expected that imports will be gradually reduced.

Plentiful supplies of most of the foundry irons are available, with present production enforcing on the furnaces the necessity to add to stocks with the resultant economic disadvantages. Makers of low-phosphorus irons are better placed as they are able to dispose of most of their production and in some grades larger tonnages could be taken up. The engineering and speciality foundries are generally well placed for business for high-duty castings and, in addition to the low-phosphorus irons, they are taking up fairly good tonnages of hematite and some refined irons. Both the latter grades are easy in supply and after home demands are met supplies are available for the export market. The motor vehicle trades continue to schedule for improved quantities of castings and many other busy trades are indenting for appreciable tonnages, including machine-tool makers, power and electrical plant manufacturers, the heavy engineering trade, etc.

The light jobbing and textile foundries continue quiet with orders scarce and forward buying negligible, hence the moderate demand for high-phosphorus pig-iron. Economic conditions affect adversely the demand for light castings from domestic-equipment makers and builders, and the foundries are content to buy only those tonnages of pig-iron which are needed for consumption. Producers of this iron carry appreciable stocks, but export business alleviates this position to some extent.

The foundries are well supplied with scrap. Arisings of heavy cast-iron and machinery scrap are generally accepted, but there is little demand for the light and medium grades. Sufficient foundry coke is being delivered, but stocks at some units are low, particularly where Welsh grades are used. Ganister, limestone, and firebricks are readily available.

Supplies of steel semis are ample and the re-rollers are not in a position to take up all the tonnages offered from either home sources or abroad. Stocks on hand at the re-rolling mills are fairly good, and the tendency is to keep these at the lowest possible limit consistent with consumption needs. In the English Midlands there is a dearth of orders for small sizes of bars and sections, and in general orders coming to hand are fewer and lower in tonnages. Present economic conditions and uncertainty of the future are affecting forward buying, and consumers and stockists keep stocks within reasonable limits. For some products the re-rollers have good demands including reinforcing bars and sheets, and the heavier sizes of bars and sections.

Non-ferrous Metals

Growing confidence in the ability of the buffer stock manager to maintain the price of cash tin at £730 a ton, the strike at the Penang smelter, and uncertainty as to whether the International Tin Council will impose export quotas have all contrived to advance the price of three months' metal markedly. At one stage the three months' price had fallen as low as £680 a ton, representing a discount over cash metal of approximately £50 a ton. However, the "back" closed appreciably last week and is currently around £12 a ton.

The International Tin Council met yesterday (Wednesday) in London and it will be interesting to see whether import quotas are to be imposed. Before the council met, delegates of the producing countries recommended that their governments make their next contribution in cash, which indicates clearly their desire to place the buffer stock manager in a position to continue to support the market. Meanwhile, the brisk turnover in the market recently has died away, but the tonnage now absorbed may well be the prime factor in creating a shortage in the future, in which case the price—under existing regulations—must move to between £830-£880 a ton before it can be sold on the market. In America the market is quietly steady with the price at around 89 cents a pound.

Copper continues unsteadily in London and quiet in New York. Stocks in the UK have not shown much change in recent weeks, so that there has been little or no pressure to alter the present contango rate. Buying from the Continent has been at a low ebb and there is now no talk of an end of the year upsurge in demand. In the US business is only modest in spite of the lower custom smelter price. Talk is centred around whether the producers will lower their price from its present level of 27 cents a pound. It is difficult to justify the 2 cent spread between it and the custom smelter price, but the essential point seems to be that even if the price were lowered it would not stimulate any new business, and this may well be the deciding factor.

Lead is very quiet in London and quietly steady in New York, where the price remains at 13¼ cents a pound. This market continues to be overshadowed by the Tariff Commission hearings.

Zinc is quiet in London and in New York for "Prime Western," but buying of special high grades appears to be maintaining its improvement. The price is 10 cents a pound. The GSA has again called for tenders for lead and zinc delivery by January, 1958. However if the Tariff Commission comes to any quick decisions, it could be the last of such tenders.

AFTER TESTS AND NEGOTIATIONS extending over two years, ATAC, the municipal traffic combine of the City of Rome, has decided to standardize entirely on Nu-Swift pressure-charge-operated fire extinguishers and has placed its first order. ATAC, which has 15,000 employees and is reputed to be the largest surface passenger transport organization in Europe, has previously used Italian-made extinguishers.

MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11, announce they have organized what they have christened, a "Miss Suprex Competition, 1958." It takes the form of a scheme to discover the firm's crucible with the longest service life in a foundry. The firm is offering an unusual prize to the winning foundry of a barrel of specially-brewed beer and two more crucibles, free of charge. Entry forms for the competition are available on writing to Battersea.

In this type of sand mixer 'FULBOND' ensures an even mix with higher permeability and strength.

For service and information write to :

THE FULLERS' EARTH UNION LTD.

Patteson Court, Nutfield Road, Redhill, Surrey

Telephone: REDHILL 3521

CMF. 30

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

December 4, 1957

PIG-IRON

Foundry Iron.—No. 3 IRON. CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S. 1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £50 0s. 0d. to £52 15s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 27s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 2d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 2d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £96 0s. 0d. to £99 10s. 0d., basis 60 per cent. Cr, scale 33s. 0d. per unit; over 6 per cent. C, £94 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 33s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr.; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C.* 2s. 3d. to 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3½d. to 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3¾d. to 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 3d. to 7s. 10½d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 22s. 0d. to 23s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £87 19s. 3d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £33 1s. 6d.; tested, 0.08 to 0.33 per cent. C, £34 1s. 6d.; hard (0.41 to 0.60 per cent. C), £35 3s. 0d.; silico-manganese, £44 2s. 6d.; free-cutting, £37 5s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 7s. 0d.; silico-manganese, £44 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 18s. 6d.; acid, up to 0.25 per cent. C, £43 10s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 12s. 0d.; boiler plates (N.-E. Coast), £45 2s. 0d.; floor plates (N.-E. Coast), £44 1s. 0d.; angles, N.-E. Coast, £40 6s. 6d.; joists, N.-E. Coast, £40 2s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 8s. 0d. (under 10 tons to 4 tons, £41 5s. 6d.; under 4 tons to 2 tons, £41 10s. 6d.); hoop and strip, coils, £40 10s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £45 16s. 0d.; black sheets (hand mill), 24 g., £59 4s. 6d.; galvanized corrugated sheets, 24 g., £68 0s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £69 9s. 6d., nickel-chrome, £100 12s. 6d.; nickel-chrome-molybdenum, £112 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £185 0s. 0d. to £185 10s. 0d.; three months, £189 10s. 0d. to £190 0s. 0d.; settlement, £185 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 9½d. per lb.; rods, 209s. 9d. per cwt. basis; 20 s.w.g., 243s. 0d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £718 0s. 0d. to £719 0s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—First half December, £76 5s. 0d. to £76 10s. 0d.; first half March, £77 5s. 0d. to £77 15s. 0d.

Zinc.—First half December, £64 12s. 6d. to £64 15s. 0d.; first half March, £64 12s. 6d. to £64 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations £100 5s. 0d.; rolled zinc (boiler plates), all English destinations, £98 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £88 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 6d. per lb.; sheets to 10 w.g., 161s. 6d. per cwt. wire, 2s. 3½d.; rolled metal, 161s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £137; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £180; HTB2 (38 tons), — ; HTB3 (48 tons), £205.

Gunmetal.—BS1400, LG2 (85/5/5/5), £168; LG3 (86/7/5/2), £178; G1 (88/10/2/½), £234; (88/10/2/1), £225.

Phosphor Bronze.—BS1400, PB1 (AID released), — per ton.

Phosphor Bronze Strip, etc.—Strip, 236s. 0d. per cwt.; sheets to 10 w.g., — per cwt.; wire, 3s. 6¾d. per lb.; rods, 2s. 10½d.; tubes, 2s. 10½d.; chill cast bars: solids 2s. 10d., cored 2s. 11d (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 6d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 10¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 9¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £214; AB2, £226.

* Average 68-70 per cent.